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MAY 21 1940
DETROIT

A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

First Copy

MAY, 1940

...NNELING METHODS on New ...'s 85-mile long Delaware aque... a 13½-19½-ft.-diameter bore ...g driven through rock by eleven ...ctors.

★

...W PLYWOOD OVERCOAT for ...ft. tryion at New York World's

★

...ER TRACTORS speed earth ...ing with big scrapers on Penn... Turnpike.

★

...WERFUL TWO-WHEEL TRAC... move fast in making earth fill ...ware dam.

★

...ALL TOOLS help contractor on ...ing project.

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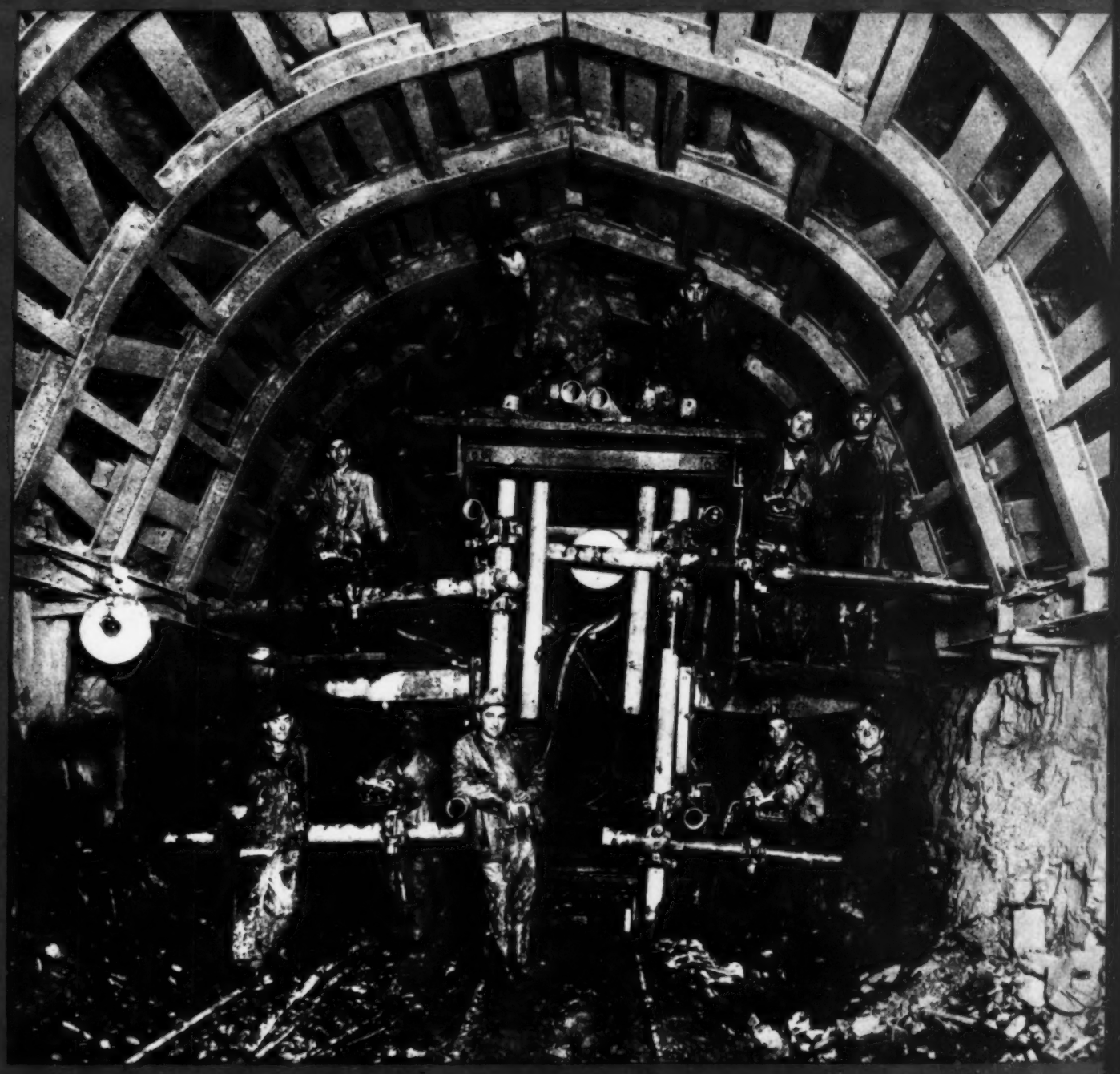
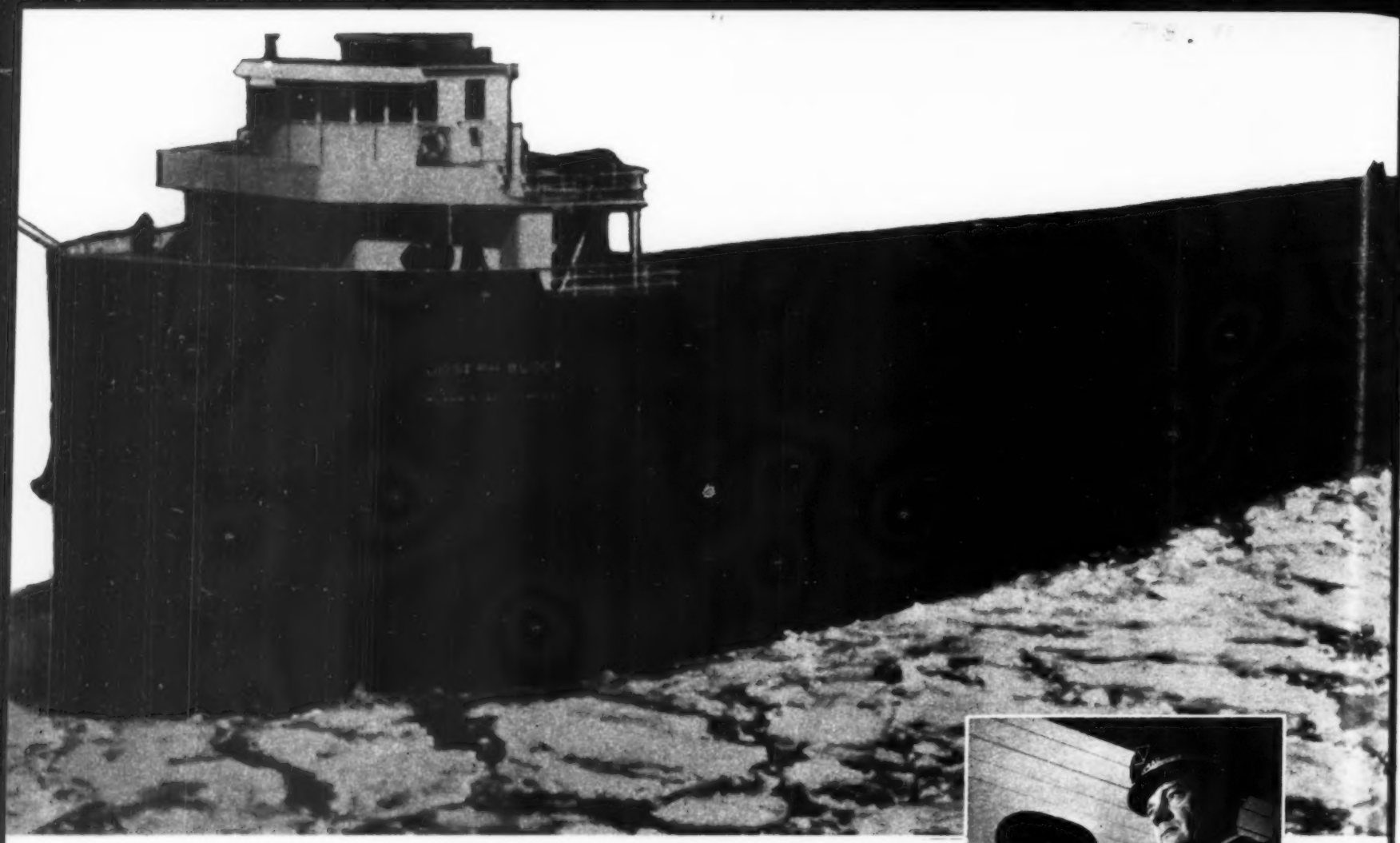


DRILL JUMBOS speed advance of two-score headings in 85-mi. Delaware aqueduct tunnel.



Inland Ore Freighters First to Open the 1940 Shipping Season!

FIRST ship in 1938 to break through the ice, pass the Soo, and open the upper lakes shipping season was the Inland Steel freighter, Philip D. Block.

Again in 1939, navigation was opened by the L. E. Block, flagship of the Inland Fleet, which holds the record for transporting the largest single ore cargo of 15,778 gross tons.

Now in 1940, the Inland Fleet moves north into the ice fields to bring down raw materials from Inland mines and quarries.

The Inland Fleet is an important unit of one of America's largest integrated steel producers, for Inland owns ore and coal mines, quarries, ships, docks and mills —every facility for steel making. From the time the raw materials leave the ground until the last metallurgist makes the final inspection and the steel is ready for the customer's use, Inland maintains continuous unified control of every process.

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CURRENT JOBS

....and Who's Doing Them

BUILDINGS

Public—In Birmingham, Ala., $2,377,350 contract for housing project comprising 69 buildings went to **Algernon Blair,** of Montgomery, Ala. In Baltimore, Md., Frederick Douglas Homes housing project of 397 dwelling units will be built by **John McShain, Inc.,** local contractor, for $1,278,000. Another Baltimore contract for 434-unit housing project went to **Woodcrest Construction Co.** and **Rosoff Bros., Inc.,** of Brooklyn, N. Y., for $1,343,000. In Panama Canal Zone, officers' quarters, group A will be erected by **Tucker McClure** and **Thompson-Markham Co.,** of Los Angeles, Calif., for $3,930,916 and $4,511,918 respectively; group B to be constructed by **J. A. Jones Construction Co.,** of Charlotte, N. C., for $2,888,000. **Henke Construction Co.,** of Chicago, Ill., obtained housing contract for 86 units at Blue Grass Park and 206 units at Charlotte Court in Lexington, Ky., for $639,345. A $1,576,000 negro housing project consisting of 600 dwelling units will be built in Atlanta, Ga., by **Virginia Engineering Co.,** of Newport News, Va. A bid of $689,204 obtained for **Skolnick Building Corp.,** of New York City, contract for twenty-two two-story brick houses in New Bedford, Mass. Additional stories' to post office and court house in St. Paul, Minn., are under construction by **Henry Dattner,** of Detroit, Mich., for $540,000.

Commercial—In Chicago, Ill., **George A. Fuller Co.,** local contractor, will build twenty-story hospital building for $3,000,000. The **Cummins Construction Corp.,** of Baltimore, Md., will build in that city a six-story telephone building for $1,000,000. Successful bidder for a sanatorium and hospital in Sherbrooke, Que., Canada, was **Francois Jobin, Inc.,** of Quebec City, for $600,000. In St. Louis County, Mo., the **Bertram Construction Co.,** local contractor, was awarded $400,000 contract to build 131 5-room brick bungalows with attached garages. Two dormitory buildings for negro university in Atlanta, Ga., will be built by the **Barge-Thompson Co.,** local contractor, for $500,000.

Industrial—Steam generating plant for Central New York Power Co., at Oswego, N. Y., is under construction by **Stone & Webster Engineering Corp.,** of New York City, for $7,000,000, with **Bates & Rogers Construction Corp.,** of Chicago, as subcontractor on foundations. Another contract for a steam plant in Oleum, Calif., for Pacific Gas & Electric Co., was awarded to **MacDonald & Kahn,** of San Francisco, for $1,000,000. Concrete substructure for ten-story power plant in Macon, Ga., will be built by **Cornell Young,** local contractor, for $4,000,000. One-story manufacturing building for International Harvester Co., in East Moline, Ill., is under construction by **Tunnicliff Construction Co.,** of Davenport, Ia., for $1,000,000. At Refugio, Tex., **Gasoline Plant Construction Co.,** of Houston, will build a recycling plant for $360,000.

HEAVY CONSTRUCTION

Fern Ridge dam in Oregon will be built for $723,591 by **Morrison-Knudsen Co.,** of Boise, Idaho. Superstructure contract for airplane hangar at Floyd Bennett Field, Brooklyn, N. Y., went to **Jonwal Construction Co.,** of New York City, for $227,400. At Washington National Airport, Washington, D. C., contract for two hangars and a terminal building was awarded to **McCloskey & Co.,** of Philadelphia, Pa., for $3,049,000; two contracts totaling $7,209,400 for seven hangars, two terminal buildings and garage, at the same airport, were awarded to **John McShain, Inc.,** of Philadelphia. Fairfax-Jersey Creek levee project in Kansas City, Kan., is being built by **Metcalfe Construction Co.** and **Hamilton Construction Co.,** of Kansas City, Mo., for $1,569,111. **S. S. Magoffin,** of Englewood, Colo., received contract for excavating section of Continental Divide tunnel for Colorado-Big Thompson project in Colorado, for $471,123. Birch Hill dam, in Massachusetts, is under construction by **B. Perini & Sons, Inc.,** of Framingham, for $535,829. The **J. F. Shea Co.,** of Los Angeles, Calif., received contract for replacing portions of steel siphons along Los Angles equeduct, for $496,253.

HIGHWAYS AND BRIDGES

Among recent highway and bridge contract awards are the following: Illinois: $396,226 to **F. F. Wier Construction Co.,** of Moline. Indiana: $240,430 to **Grace Construction Co.,** of Ft. Wayne; $196,422 to **Feigel Construction Co.,** of Evansville; $417,639 to **J. C. O'Connor & Sons, Inc.,** of Ft. Wayne; $199,149 to **D. M. Vaughan,** of Lafayette, Kentucky: $189,148 to **Foster & Creighton Co.,** of Nashville, Tenn. Mississippi: $341,988 to **F. S. Neely,** of Amory. North Carolina: $678,295 to **Blythe Bros.,** of Charlotte. Ohio: $478,976 to **Jones & Crumley,** of Cincinnati; $470,923 to **W. H. Ringwald & Sons Co.,** of Chillicothe; $432,000 to **R. J. Dienst,** of Columbus; $234,858 to **Hollinger-Davidson Co.,** of Akron. Pennsylvania: $271,393 to **Joseph Banks Construction Co.,** of Wilkes-Barre; $288,667 to **Midwest Construction & Asphalt Co.,** of Chicago, Ill.; $202,984 to **L. M. Hutchinson,** Mt. Union; $250,220 to **Laub & Collins,** of Somerset; $247,490 to **Paul Construction Co., Inc.,** of Cresson. In Connecticut a bridge contract for $107,176 was awarded to **Mariani Construction Co.,** of New Haven. Contract for bridge construction in Louisiana was awarded to **Austin Bridge Co.,** of Dallas, Tex., for $346,287.

MAY, 1940
Copyright, 1940
Established 1919
McGraw-Hill Publishing Co., Inc
330 West 42nd St., New York
Construction Methods
A Pictorial Survey of Current Practice, Equipment and Materials
ROBERT K. TOMLIN, Editor
A. E. PAXTON, Manager
Editorial Staff: Vincent B. Smith, Paul Wooton (Washington)
N. A. Bowers (San Francisco) Nelle Fitzgerald

The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How **RAISING OF 200-TON GIRDERS** through lift of 130 ft. was handled by derricks on bridge job. —p. 43

How **ROCK TUNNEL** 85 miles long was driven from 26 shafts by 12 contractors. —p. 46

How **STEEL ROOF SUPPORT** of two types used 6-in. ribs to hold rock in bore for tunnel. —p. 46

How **MUCK CARS** in tunnel were handled by "cherry-picker" hoist and electric locomotives. —p. 46

How **DRILL JUMBO** carrying battery of drifters was equipped with adjustable horizontal arms. —p. 47

How **TUNNEL MUCK** at bottom of shaft was unloaded quickly by rotary car-dumper. —p. 48

How **LOADER CONVEYOR** on mucking machine delivered rock to tunnel cars. —p. 48

How **PLYWOOD SHEATHING** was applied to 610-ft. high World's Fair Trylon. —p. 50

How **SCAFFOLD SUPPORT** was provided by steel bracket. —p. 50

How **EARTH MOVING** at big dam was handled by fast-moving two-wheeled pneumatic-tired diesel tractors. —p. 55

How **SPECIAL COUPLING** aided operation of puller and pusher tractors moving earth scrapers. —p. 55

How **RECOIL DEVICE** improved operation of well-drill rig. —p. 58

How **SPLICING OF REINFORCING BARS** of steel was done with use of wire rope clips. —p. 58

How **WELDED JOINTS** were tested with X-ray machine. —p. 58

How **SHOVEL DIPPER TOOTH** was sharpened with trip hammer. —p. 59

How **SIPHONS** removed water from behind cofferdam. —p. 59

How **PUSHER TRACTORS** speeded scraper loading on turnpike project. —p. 60

How **BULLDOZER ATTACHMENT** pushed 12-yd. scraper. —p. 61

How **SEPARATING CURB** on divided highway was concreted with aid of traveling hopper. —p. 62

How **CHAINS AND HOOKS** should be inspected to insure safe service. —p. 64

How **JOB-BUILT TREMIE** placed concrete for bridge substructure. —p. 65

How **WOODWORKING SHOP,** equipped with small tools helped builder on housing project. —p. 66

CONSTRUCTION METHODS, May, 1940. Volume 22. Number 5. Published Monthly, price 20¢ a copy. Subscription rates—United States, Canada, Mexico and Central and South American countries, $1.00 a year; three years for $2.00. All other countries, $2.00 a year or 10 shillings. Entered (or reentered) as second class matter December 16, 1936 at the Post Office at New York, N.Y., U.S.A., under the act of March 3rd, 1879. Printed in U.S.A. Cable address: "McGrawhill, New York." Member of A.B.P. Member of A.B.C. Contents Copyrighted 1940 by McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York, N. Y.

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THE JOB JESTER

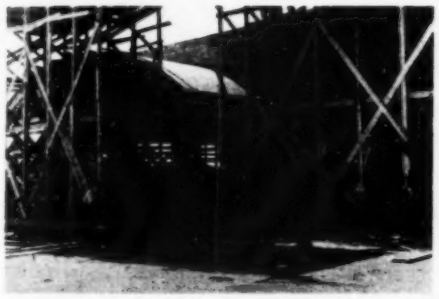
CARTOONS DRAWN FOR CONSTRUCTION METHODS

"Everything's gone wrong since Mamie lost her glasses!"

"We find that sawed off handles tend to discourage shovel-leaning!"

A NEW AND GREATER SOUTH IN THE MAKING

(1) Armstrong Tire & Rubber Co. plant, Natchez, Miss. Main factory, 160 x 760 ft., office building, power plant. Architectural concrete exterior; reinforced concrete Z-D barrel-shell roof.



(2) Wooden trusses on movable scaffolding supported the curved plywood forms for the barrel shell roof slabs. A stiff Lone Star mix worked into place easily, helping to assure clean exposed surfaces.

(3) The Z-D roof, with its semi-circular barrels, permits hot air to rise to the center of each barrel, where it is drawn off by motor-driven ventilators.

(4) Z-D type roof permits spacing of columns on 50′ centers, instead of 20′ centers, usual with flat-slab roof construction; larger areas free from obstruction facilitate plant layout.

NEW ARMSTRONG TIRE FACTORY AT NATCHEZ TYPIFIES SOUTH'S PROGRESS

FIRE-SAFE, PERMANENT LONE STAR CONCRETE STRUCTURE . . . AT ATTRACTIVELY LOW COST

TYPICAL of the South's steady industrial progress is the new reinforced concrete plant of Armstrong Tire & Rubber Co., at Natchez, Miss., built throughout with Lone Star Cement. Expressive also of sound planning and the inherent economies of concrete is the fact that this new factory provided 188,000 sq. ft. of usable floor area at a low unit cost of $1 per sq. ft. Roberts & Schaefer Co., Chicago, engineers; J. T. Canizaro, Jackson, Miss., architect; B. L. Knost, Pass Christian, Miss., general contractor.

One of the features of this new plant is its Z-D barrel-shell roof construction, which does away with trusses and braces and facilitates plant layout by providing large areas, free from obstruction.

Lone Star Cement was selected on its outstanding performance record ever since 1900. It pays to figure every job with both Lone Star Cement and 'Incor' 24-Hour Cement. Use 'Incor'* where dependable 24-hour service strength shows a net saving. Elsewhere, use Lone Star. You gain either way—because better cement makes better concrete. Write for copy of "Cutting Concrete Costs." Lone Star Cement Corporation, Room 2265, 342 Madison Avenue, New York.

*Reg. U. S. Pat. Off.

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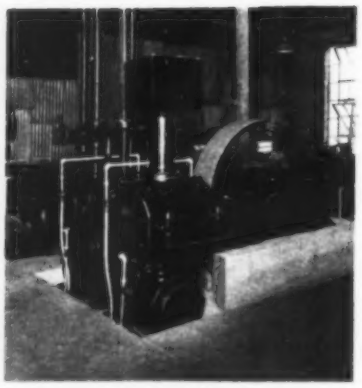
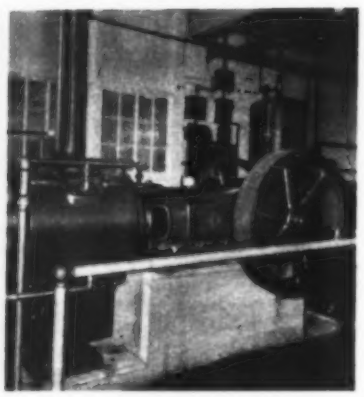
KEEPS VALVES WORKING

EXCAVATING

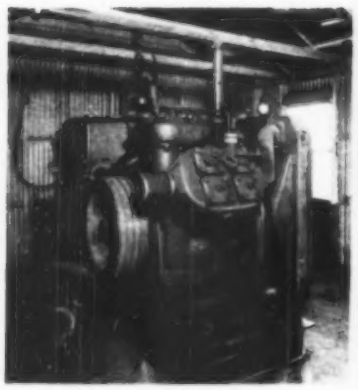


QUARRYING

ROAD WORK



FACTORY



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Contracts using EUCLIDS...29
Contracts using EUCLIDS exclusively.....27
Per cent of contracts using EUCLIDS exclusively..... **73%**

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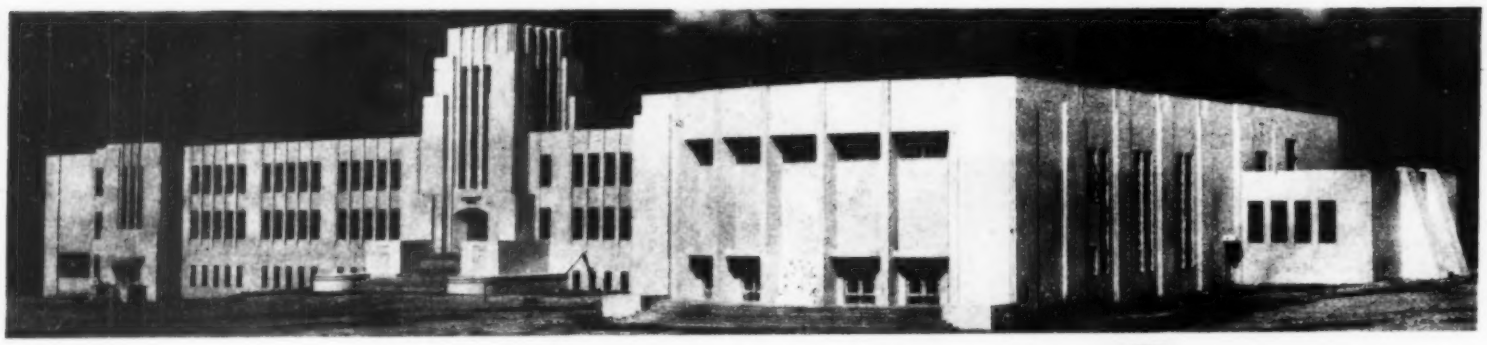

Be sure to specify PLYFORM for all concrete form work!

Plyform panels cost slightly more than regular plywood . . . but give far better results and service!

● If you want to get multiple re-uses from your forms . . . if you want forms you can depend on . . . if you want to be sure that the panels you are using are constructed with special care, special glues, special veneers and special oiling and edge sealing . . . if you want to get the best possible concrete surfaces . . . *use Plyform, the concrete form grade of Douglas Fir Plywood.*

In most areas Plyform costs just over 1c a square foot more than Sound 2 Sides plywood (Plypanel grade) of the same size and thickness. But this extra investment will repay you many times. So specify Plyform and make sure that the diamond-shaped Plyform "grade trade-mark" and silver-green edge seal appear on every panel you use for form work.

If you aren't acquainted with all the superiorities of Plyform, write for free technical booklet. Douglas Fir Plywood Association, Tacoma Building, Tacoma, Washington.

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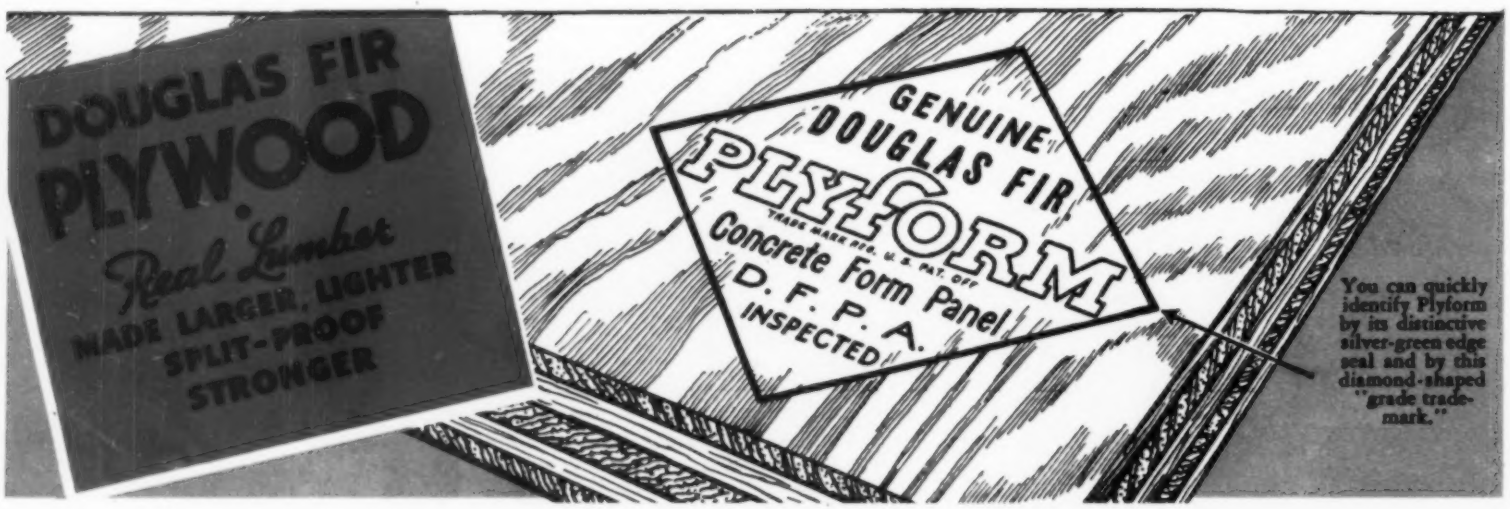
1 Plyform is manufactured in strict accordance with U. S. Commercial Standard CS45-38. Only special highly water-resistant premium glues are used. The cores of the panels are better than those used in other grades of Douglas Fir Plywood. The faces are similar in appearance to SO2S Plypanel but must be at least 1/8" thick before sanding.

2 Every panel is sanded satin-smooth, oil-treated and edge-sealed at mill.

3 Both sides of every Plyform panel are usable for forming smooth concrete surfaces. Plyform serves as sheathing and lining combined.

4 The distinctive silver-green edge seal and the diamond-shaped "grade trade-mark" stamped on every Plyform panel are positive, instant identifications of a genuine Plyform panel. Specify Plyform!



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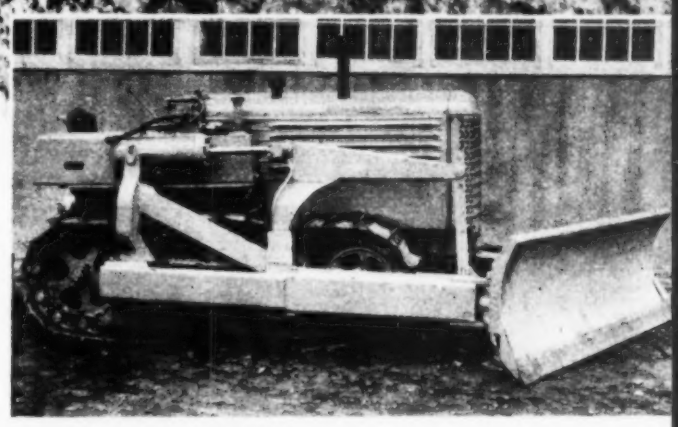
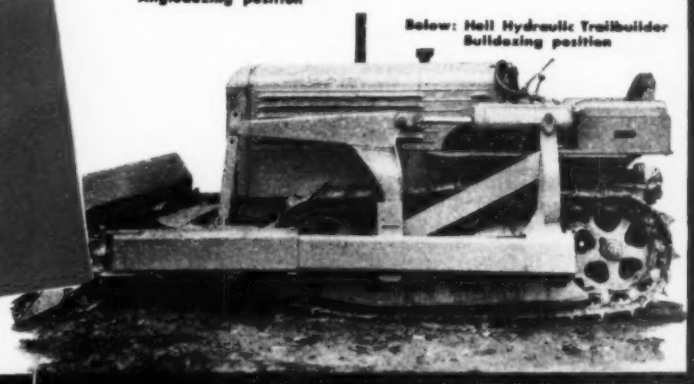


Above: Heil Hydraulic Trailbuilder Angledozing position

Below: Heil Hydraulic Trailbuilder Bulldozing position



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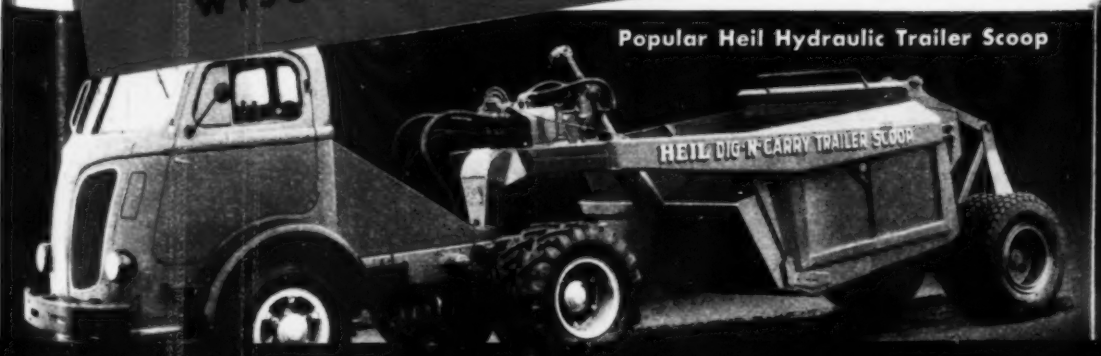

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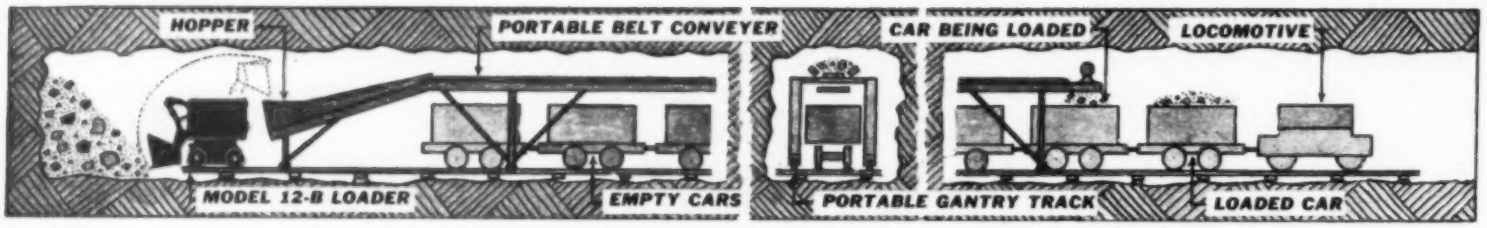


Here's how the Alpine-Draper Tunnel is being driven at lowest cost with

EIMCO-FINLAY LOADERS

The 18,000 ft. Alpine-Draper Tunnel, now approaching completion near Draper, Utah, is part of the Salt Lake City Aqueduct Project, and must be lined with steel horse-shoe sets and reinforced concrete to 6½ ft. x 6½ ft. Since all over-breakage must be filled in with concrete at the contractor's expense, it was necessary to devise an efficient method of driving and mucking out the tunnel without extra width for passing cars.

To solve this problem, each of the two headings (being driven to meet) is equipped with a Model 12-B Eimco-Finlay Loader which discharges into the hopper of a portable belt conveyor extending over the top of a sufficient number of cars to carry away all of the muck from a 6-ft. round. Loader is not attached to conveyor hopper, but moves back under its own power from muck pile to discharge into hopper. Conveyor rides on gantry track outside of car track, and is pulled forward at intervals by loader to minimize shuttling distance.

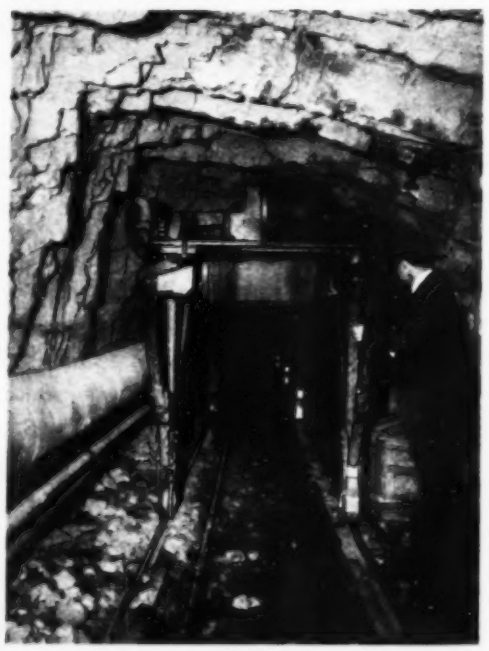
Cars are loaded one at a time, from discharge end of conveyor as shown in diagram above, the train being spotted by the same electric locomotive used for haulage. Hopper section is hinged and can be raised to permit passing loader out under conveyor if necessary. No jumbo is used, the two drills being mounted on a vertical column.

Operating by this method, a complete round can be loaded out in 30 minutes—seldom requires more than 50 minutes. Two rounds are drilled and loaded out easily in an 8-hr. shift. Daily advance in each heading averages 30 ft.—has been as high as 41 ft. Tunnel will be completed well ahead of schedule, and over-breakage has been reduced to an absolute minimum.

All Eimco-Finlay Loaders are operated by compressed air from the same lines that supply the drills—are simple, sturdy, and relatively inexpensive to install and maintain. Hundreds now in use throughout the entire mining world are the best evidence of their superiority over any other type of machine for mucking out drifts and tunnels up to 15 ft. in width. The Model 12-B Eimco-Finlay operates efficiently in tunnels as small as 5 ft. wide and 6½ ft. high—loads cars up to 50 cu. ft. in capacity at the rate of a ton per minute. Models 21 and 40 are equally efficient for loading larger cars, up to the largest sizes used underground.

Complete information regarding Eimco-Finlay Loaders, together with diagrams and data describing their use, AT THE PRESENT TIME, in four different types and sizes of tunnels, will be furnished promptly on request.

Model 12-B Eimco-Finlay Loader at Alpine-Draper Tunnel, with conveyor hopper directly in rear. 30-degree swing to either side permits cleaning up working face with ease. Bucket capacity 5½ cu. ft.



Above, discharge end of Alpine-Draper conveyor. Below, train of cars entering tunnel. These eleven cars will run under the conveyor and carry away all of the rock from a complete 6-ft. round.

THE EIMCO CORPORATION, Salt Lake City, Utah, U.S.A.

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Rio de Janeiro, Santiago and Antofagasta

J. E. TREACY COMPANY
Str. I. C. Bratianu No. 4
Ploesti, Roumania

HAEHRE & COMPANY
Slotsgt 7, Oslo, Norway

• Replacement parts carried in stock by agents indicated with asterisks

For Small Shovel Users with BIG ideas

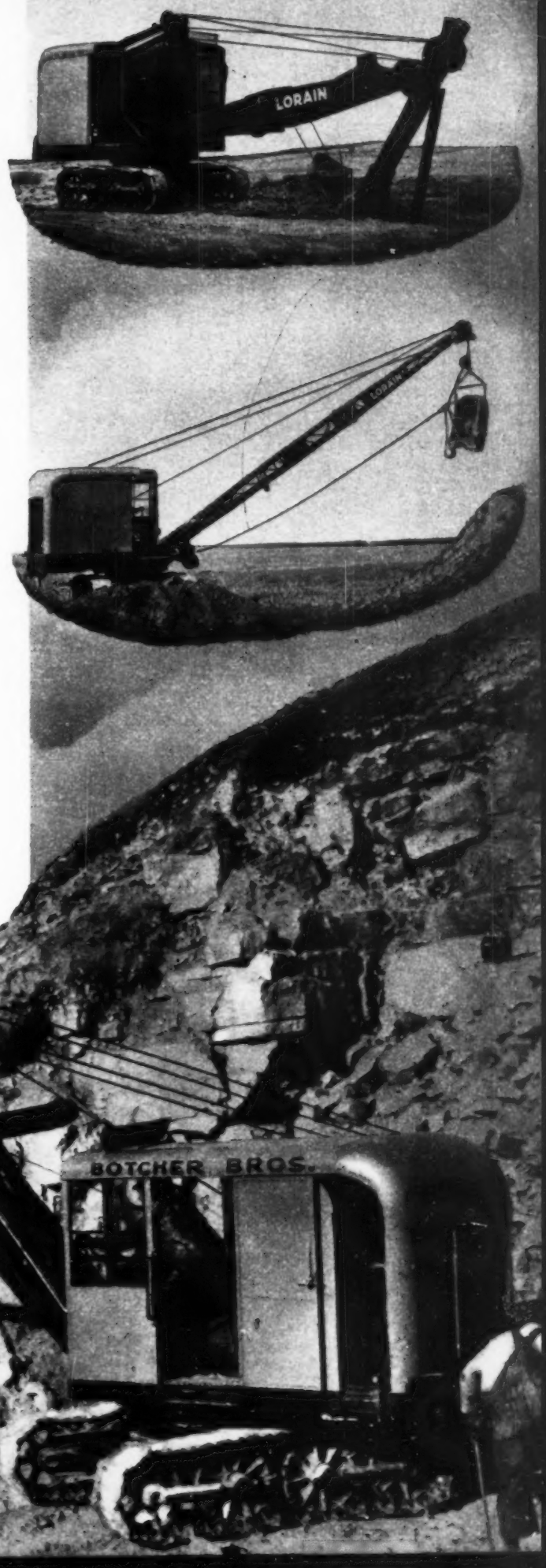
● Just because a shovel carries a ⅜-yd. dipper is no reason it can't be built to the proved principles of big machines. The Lorain-27A is the one ⅜-yd. unit that gives you the economies and increased production resulting from such big machine design and quality at a cost comparable to its size.

And here's what we mean by "big." A ⅜-yd. Lorain-27A shovel weighs 21,500 lbs.—handles a 16 ft. boom and 12 ft. 4 in. stick—is powered by a 6 cylinder motor designed especially for shovel service—has a Center Drive turntable providing direct-to-the-point power transmission along with utmost simplicity and strength of construction.

Now, take a look at the Lorain-27A dragline pictured above. Note the working angles of the boom. That's another advantage of big machine design—plenty of capacity for reaches and ranges that eliminate "straight-up" booms—and enable this ⅜-yd. machine to do a real crane, dragline or clamshell job without constant moving.

Write today for catalog describing the many design and construction features of the ⅜-yd. Lorain-27A. It's built for you small shovel and crane owners with *big* ideas.

UNIVERSAL CRANE DIVISION
THE THEW SHOVEL COMPANY
LORAIN, OHIO



⅜ YD LORAIN 27-A

New RPM DELO (DIESEL ENGINE LUBRICATING OIL) helps "CATERPILLAR" Light the World's Biggest Midway

Step right up, folks— TO ROYAL AMERICAN SHOWS!

Traveling 18,000 miles a year—entertaining 25,000,000 people in the South, Midwest and Western Canada—this big show creates all its own electric power.

Ten "Caterpillar" Diesels generate the juice for great batteries of lights—for 100,000 feet of Neon tubing—for electric motors furnishing power to the entire show.

These engines *can't* fail—and New RPM DELO sees that they *don't!* In over 4 years of operation not a single ring, piston or liner has been replaced. It has never been necessary to add oil between drains! The mechanical condition and cleanliness of all working parts are excellent. Says Royal American, "we honestly believe that much of our successful engine operation is due to New RPM DELO!"

And, the Caterpillar Tractor Co. adds to that: "*we certify that this oil is eminently satisfactory for all our Diesel engines.*" Thus another great Diesel manufacturer recommends New RPM DELO! It's the one *unequaled* oil for *your* equipment regardless of make or size. Profit by it!

New "RPM" Diesel Engine Lubricating Oil is available everywhere in the gray barrel with the blue head

Order from Your Nearest Distributor as Listed Below:

IN THE UNITED STATES

RPM DELO:
The California Company (Montana only)
Humble Oil & Refining Company
Standard Oil Company (Indiana)
Standard Oil Company (Nebraska)
Standard Oil Company of California
Standard Oil Company of Texas
Utah Oil Refining Company

Diol RPM DELO:
The Carter Oil Company, Tulsa, Oklahoma
Colonial Beacon Oil Company
Standard Oil Company of Louisiana
Standard Oil Company of New Jersey
Standard Oil Company of Pennsylvania

Kyso RPM DELO:
Standard Oil Company (Inc. in Kentucky)

Signal RPM DELO:
Signal Oil Company

Sohio RPM DELO:
The Standard Oil Company (Ohio)

IN CANADA & NEWFOUNDLAND

Imperial RPM DELO:
Imperial Oil Limited

IN BRITISH COLUMBIA & ALBERTA

RPM DELO:
Standard Oil Company of British Columbia Limited

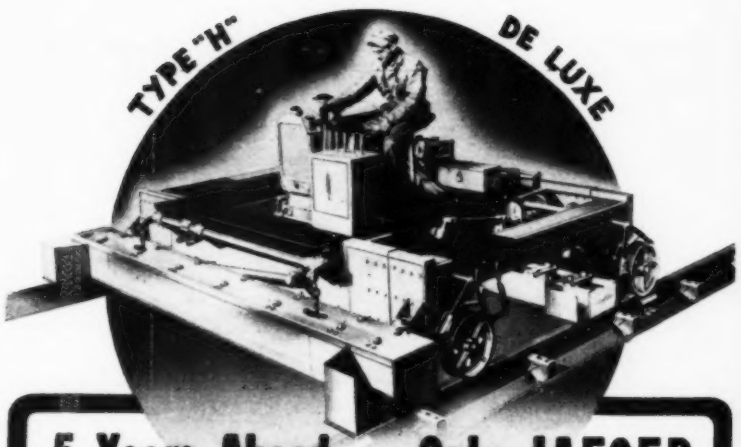
THROUGHOUT THE WORLD

RPM DELO is available through distributors in more than 100 countries.

CATERPILLAR DIESEL

RPM
DIESEL ENGINE LUBRICATING OIL

STANDARD OIL COMPANY OF CALIFORNIA



5 Years Ahead — Only JAEGER Offers This Modern FINISHER

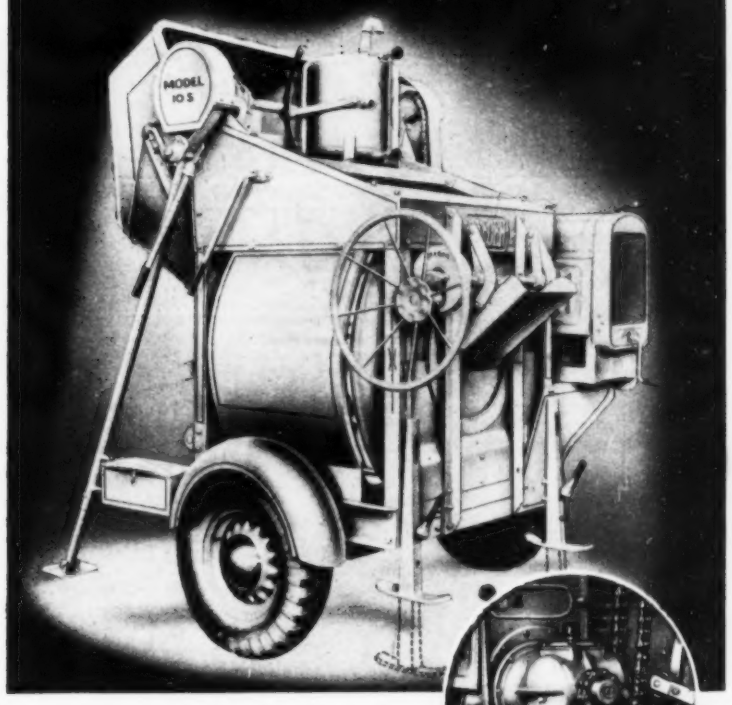
- NEW SPEED AND TRACTION to match 34E Dual Drum Pavers and Jaeger Screw Spreaders on dry mixes.
- NEW SMOOTHNESS OF FINISH practically eliminating hand work.
- NEVER BEFORE, ALL THESE FEATURES: Single 4-Speed Transmission, heavy duty automotive type — Positive 4-Wheel Drive with maximum traction — Self-Contained Center Unit and Side Trucks — Greater Telescopic Width Changes now possible — Independent Screed Controls and Fast Hydraulic Power Lift — Banked Controls in front of operator — Fully Enclosed, Spring Loaded 12" Screeds — Many other advanced features. Get new Bulletin SF-40.

JAEGER SCREW SPREADERS — a necessity with Dual Drum Pavers — remix, spread, strike off, densify the slab.

THE JAEGER MACHINE CO., 800 Dublin Avenue, Columbus, Ohio

MIXERS with AUTOMOTIVE TYPE TRANSMISSION

AND MACHINED STEEL DRUM TRACKS



Fully enclosed transmission runs in oil — 30% to 40% more efficient, quieter, smoother, longer lived — a major improvement!

. . . Built by JAEGER to Mix Faster, Trail and Handle Easier, Last Longer

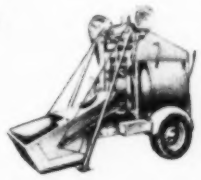
These latest SPEEDLINE Mixers — in 3½S to 56S sizes — have all the features that made Jaeger the world's biggest selling mixers, plus sensational improvements never before offered — AUTOMOTIVE-TYPE TRANSMISSION, 100% BALL BEARING SHAFTS, MACHINED ALLOY STEEL GEARS . . . plus MACHINED, HIGH CARBON STEEL DRUM TRACKS, ON CHILLED, GROUND, CAR-WHEEL ROLLERS . . . plus oversize engines and vital parts.

Here are the huskiest, smoothest running mixers ever built — combining real heavy duty service with easy handling, end discharge trailer design. 2 or 4-wheel mountings interchangeable. Get our new Catalog and prices and compare.

THE JAEGER MACHINE COMPANY
800 Dublin Avenue, Columbus, Ohio

Mixers - Pumps - Hoists - Towers - Truck Mixers - Paving Equipment

3½ S End Discharge with Measuring Batch Hopper



5S Home Builders' Mixer Has All Features of Bigger Mixers

14S Trailer with 90" Wide Skip

2 or 4 Wheels

JAEGER SPEEDLINE

JAEGER, ALONE, Gives You All These Pumping Features

- JAEGER "PRIMING JET"—Up to 5 times faster priming and re-priming—often means difference between profit and loss on job. No adjustments—no need to "gun" engine.
- POSITIVE RECIRCULATION CUT-OFF — It's controlled by flow, not pressure.
- "FULL-RANGE" IMPELLER gives high efficiency under all conditions (built of steel in 4" to 8" sizes).
- ACCESSIBLE SEAL — always outlasts the impeller.
- PATENTED SELF-CLEANING SHELL—scours while pumping, won't clog, easily accessible.
- DEPENDABLE, LONGER LIFE CONSTRUCTION — thousands of EXTRA hours of service.
- EVERY PUMP INDIVIDUALLY TESTED for capacity and pressure before it leaves our factory.

OUTSELLS EVERY OTHER PUMP

Send for New Catalog and Prices

THE JAEGER MACHINE CO.
800 Dublin Avenue - Columbus, Ohio

JAEGER "Sure Prime" PUMPS

NOT EVERY CRUDE OIL

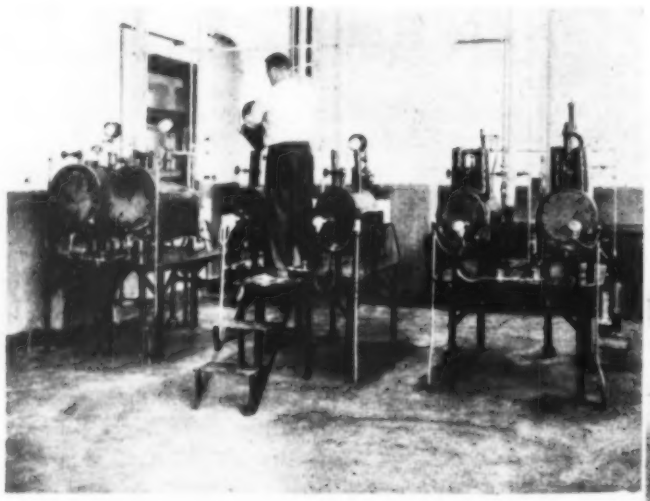
has what it takes

TO PRODUCE HIGH-GRADE ROAD ASPHALTS

Step No. 1 in producing high-grade Road Asphalts is the careful selection of the crude oils from which they are refined.

Crude petroleum is crude petroleum to the uninitiated. But nothing could be further from the actual truth. Few crudes, comparatively speaking, have what it takes to produce quality Asphalts. And of those few crudes, not all have the particular characteristics so essential in Road Asphalts.

Painstaking care and a highly perfected technique in the Selection of Crudes is the vital first step in producing TEXACO Asphalt Cements, Cutback Asphalts and Emulsified Asphalts for use in highway construction and maintenance. The emphasis placed on this step helps explain the nation-wide use of TEXACO Asphaltic products during the past 36 years.



In these small 5 and 10-gallon stills, crude oils are carefully tested to determine their fitness for use in producing TEXACO Asphaltic products. Comparatively few crudes are.

A slow-curing TEXACO Liquid Asphaltic product being used in the construction of a low-cost, all-weather surface on a Colorado highway.

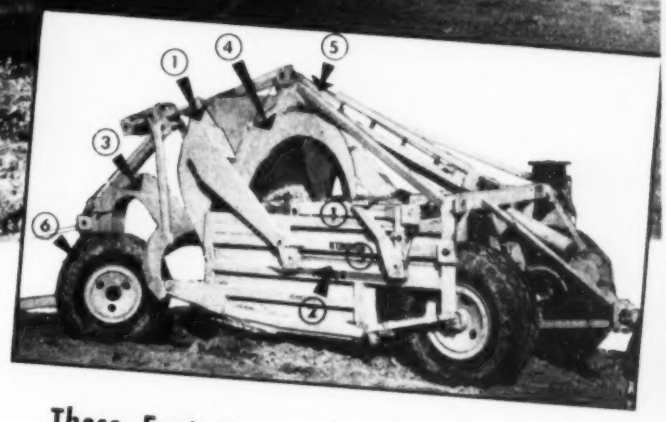
TEXACO ASPHALT

THE TEXAS COMPANY, Asphalt Sales Dept., 135 East 42nd Street, New York City

Chicago Philadelphia Houston Buffalo Kansas City Boston Richmond Cleveland Jacksonville

for Extra Profits..

MATCH YOUR NEW BIGGER-POWERED TRACTORS WITH NEW LeTOURNEAU CARRYALLS



If you've bought new tractors recently, you know that drawbar pull has increased as much as 33⅓%. Why go on using old scrapers that have outlasted 2 or 3 tractors with this new modern power?

Investigate the latest LeTourneau Carryall Scrapers. Like today's tractors, they are being constantly improved in operation, construction and design . . . improved to match added tractor power with EXTRA PAY YARD performance . . . improved to cut your costs. Latest is the Model "N" Carryall, with 33 yards heaped capacity.

Hold All the Dirt You Dig

Built to the same basic job-proved design as thousands of Carryalls now in everyday use, it has higher sides and a larger apron . . . holds in all the dirt you dig with bigger-powered tractors and pushers . . . easily adds from 2 to 5 yards to each load *without increasing loading time.*

Take full advantage of your tractor power. Try the latest model LeTourneau Scrapers. Compare them with old or new scrapers *of any make* . . . see for yourself how they increase the profit possibilities of your new bigger-powered tractors. Ask your LeTourneau-"Caterpillar" dealer to show you . . . on your own job . . . NOW . . . by a demonstration. R. G. LeTOURNEAU, INC., Peoria, Illinois, Stockton, California.

These Features on the NEW Model "N" Mean More Yardage for YOU — At LESS COST:

1. Apron and sides built higher all-round . . . retain full, heaping loads . . . prevent spilling.
2. Sheaves centered at the tailgate for direct pull . . . reduce power demand on positive ejection of larger loads.
3. New "goose-neck" yoke . . . provides greater clearance for larger-diameter tires.
4. New "A" frame design . . . gives you more room for bigger loads and speeds up loading.
5. All hoist and unloading cables placed out of the dirt . . . further reduce cable wear.
6. Larger tires engineered for better flotation.

YOU GET THEM ONLY IN LeTOURNEAU CARRYALL SCRAPERS

Eliminate Guesswork on Scraper Demonstrations . . . Insist That Loads Be Weighed. Only by weight can you determine the actual pay load of a scraper. LeTourneau welcomes weighed demonstrations. Remember: It's the "Weigh" that Pays

LETOURNEAU

CARRYALL* SCRAPERS, ANGLEDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, DRAG SCRAPERS, PUSHDOZERS, SHEEP'S

40 Years of Progress in Building BETTER MIXERS

1900

The First Smith Tilting Mixer

designed and built in 1900 by the late Mr. T. L. Smith. It was then Mr. Smith developed the now universally famous Smith "End-to-Center" mixing action.

1940

New 1940 Model Smith Tilter

with all advanced features, including automatic feed chute — duo-cone, non-clogging drum — non-lift, smooth rolling "End-to-Center" mixing action — batch balanced at center of drum — fast "Tilt and Pour" discharge — enclosed, machine cut reduction gears, running in oil — multiple V-belt drive — oversize, anti-friction bearings — machine cut, high carbon steel drum ring gear — tapered guide rollers.

Many New Refinements have been Added Recently, Resulting in even GREATER SPEED and EFFICIENCY!

The basic tilting mixer design, originated by Smith in 1900, remains essentially the same today — 40 years later. Present day Smith Mixers have the same duo-cone drum construction, the same effective "End-to-Center" mixing action and the same fast "Tilt and Pour" discharge. Details in design, of course, are constantly being improved and refined to keep abreast with the times. But the basic tilting mixer principle remains unchanged. It has definitely proven its worth, over and over again, on the world's greatest concrete projects: *Boulder Dam, Marshall-Ford Dam, Tygart Valley Reservoir, Watts Bar Dam, Parker Dam, San Francisco-Oakland Bridge, Norris Dam, Radford Dam* and many other world-famous projects. All sizes available, up to 4-yards per batch. Write for catalog. THE T. L. SMITH CO., 2851 N. 32nd Street, Milwaukee, Wisconsin, U. S. A.

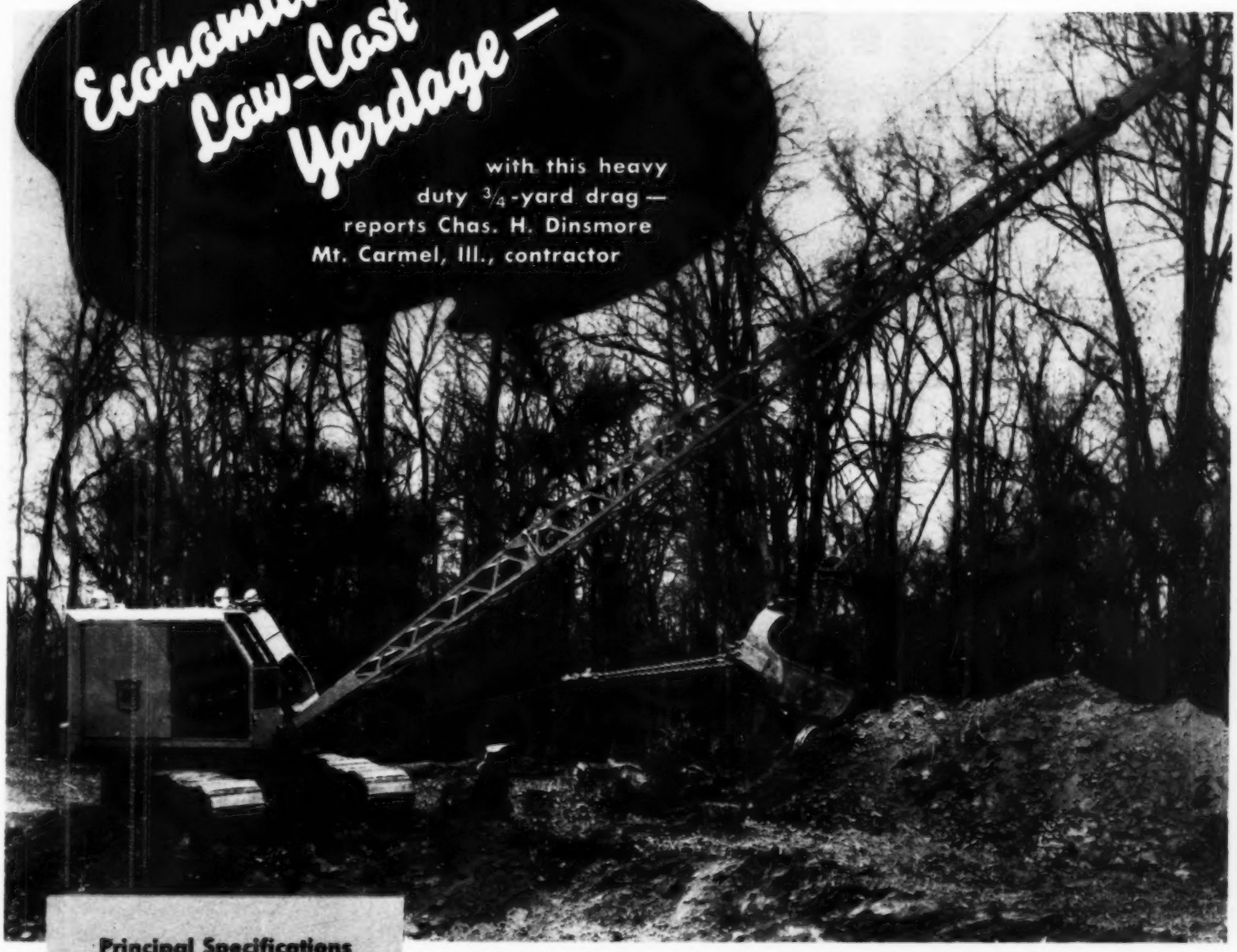
SMITH

SMITH MIXERS

USED ON THE WORLD'S GREATEST CONCRETE PROJECTS

Economical Low-Cost Yardage—

with this heavy duty ¾-yard drag — reports Chas. H. Dinsmore Mt. Carmel, Ill., contractor



Principal Specifications

¾-Yard MODEL 45 10-ton Crane

WEIGHT: 45,200 lbs. as Shovel
POWER: 6-cyl., 78 HP@1200 RPM
SHOVEL BOOM: 19' Chain Crowd
DIPPER STICKS: 14' Straddle
CRANE BOOM: 35' standard
CRAWLER WIDTH: 9' 0"
CRAWLER LENGTH: 12' 6"
GROUND PRESSURE: 10.8 lbs.
BASES: Unit Cast Alloy Steel
DRUMS: Tandem, separate shafts
CLUTCHES: Booster operated
GEARS: Helical cut
DIPPER TRIP: Power actuated
BEARINGS: All Machinery Shafts
BOOM HOIST: Wormgear or Independent
SWING SPEED: 5 RPM
TRAVEL SPEED: ¾ and 1¾ MPH
LINE PULL: 12,800 lbs.@156 FPM
DRAGLINE PULL: 14,000 lbs.@131 FPM

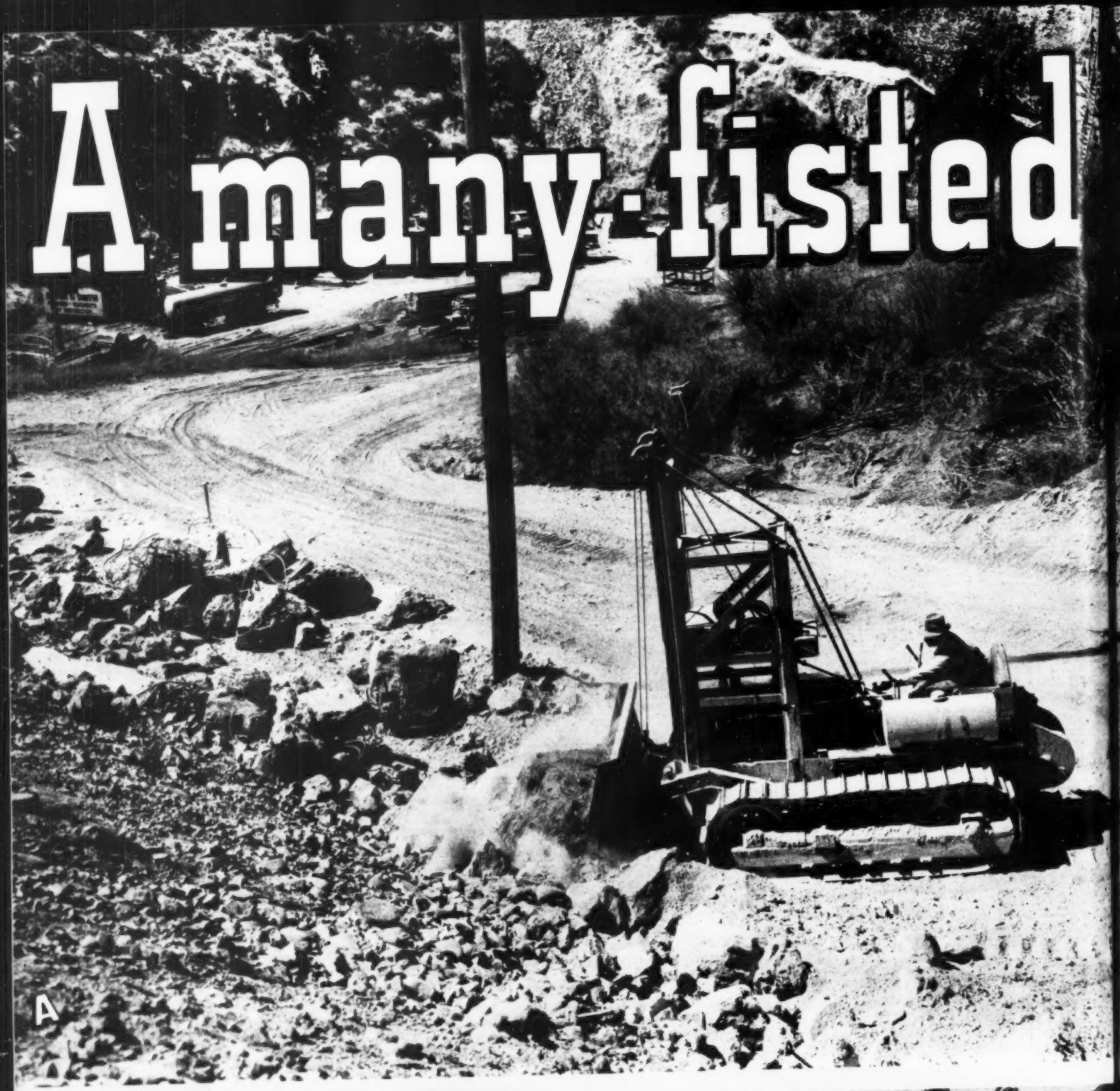
Here are just a few reasons why the BAY CITY is so popular with exacting dirt movers. Note in photo above the solid cast base of alloy steel, out-board bearing on crawler drive, roomy cab, full swivel type fairlead, ability to handle 50′ of boom and a heaped ¾-yard bucket with power to spare. These and the many operating refinements "inside the cab" are your assurance of dependable and outstanding performance at lower cost. Look over the condensed specifications, then write for your copy of our 32 page illustrated Catalog H-2 describing complete line of convertible shovels.

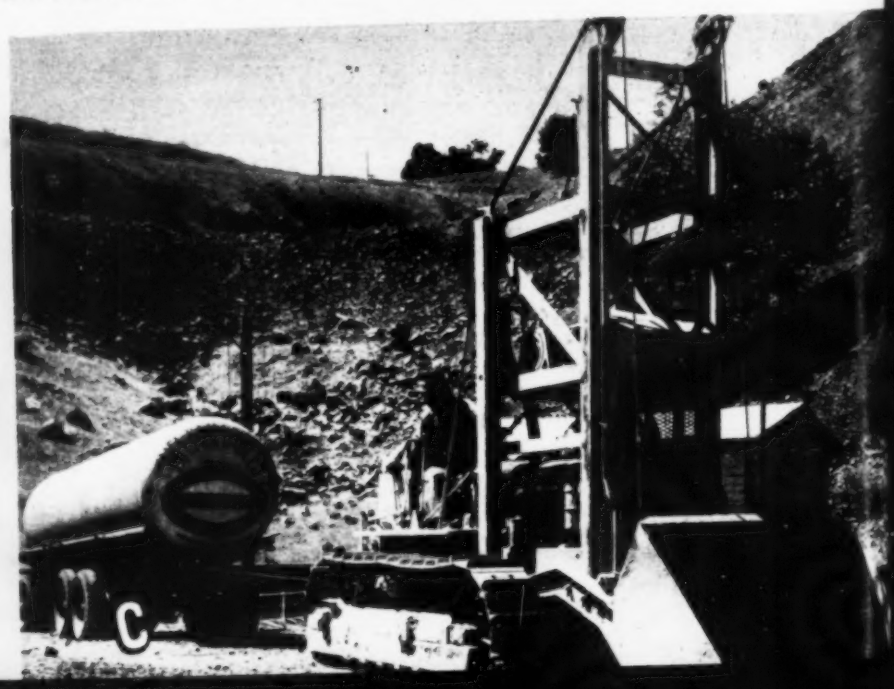
BAY CITY SHOVELS, INC., BAY CITY, MICHIGAN
Export Office: 330 W. 42nd St., New York City (OPARO)

BAY CITY

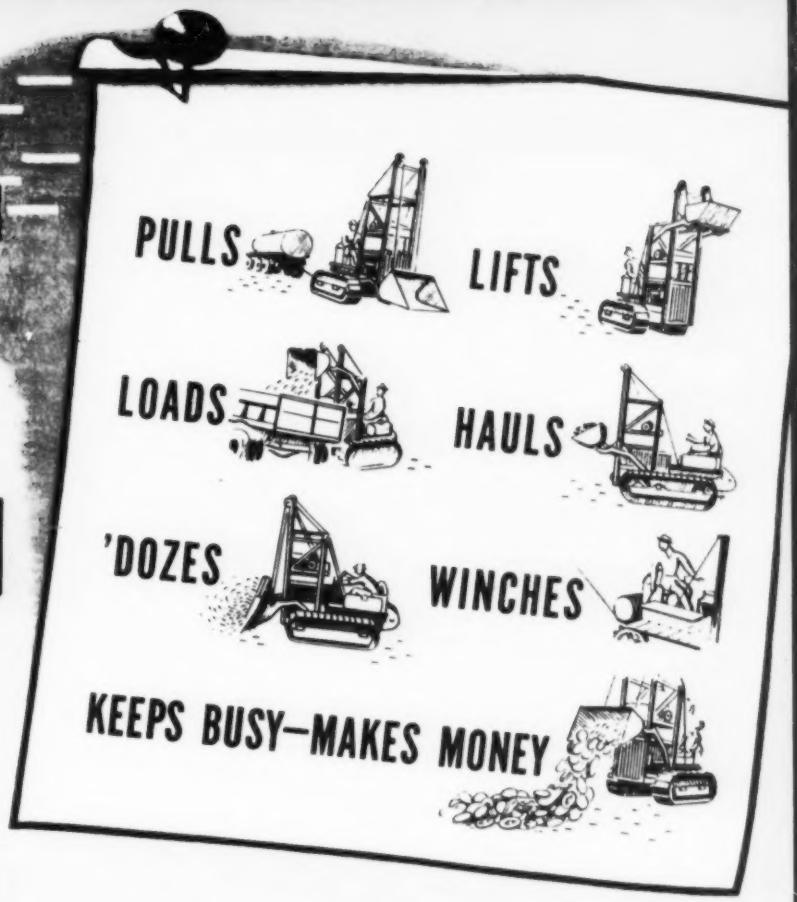
SHOVELS • CRANES • DRAGLINES • TRENCH-HOES • SKIMMERS

A many-fisted





battler AT CALAVERAS DAM



THE variety of jobs which can be handled—speedily, economically, profitably—with rugged "Caterpillar" Diesel Tractors is being widely demonstrated throughout the contracting field. Their adaptability for teamwork with other equipment is also well known. There is no better example of this than is exhibited in the outfit and work shown in these pictures—all construction scenes on the Calaveras (California) Dam project.

With a Hyster winch, and a Trackson Traxcavator equipped with bulldozer attachment, this "Caterpillar" D4 can really "go to town." It can scoop, carry, load (or dump) in one continuous operation. It can bulldoze earth, rock and rubbish. It can hook onto wagons, trailers, trucks; move equipment. And when the load is unusually heavy or the going extra tough, it can "give it the winch" with almost double the drawbar pull. A versatile, movable "package of power," indeed!

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

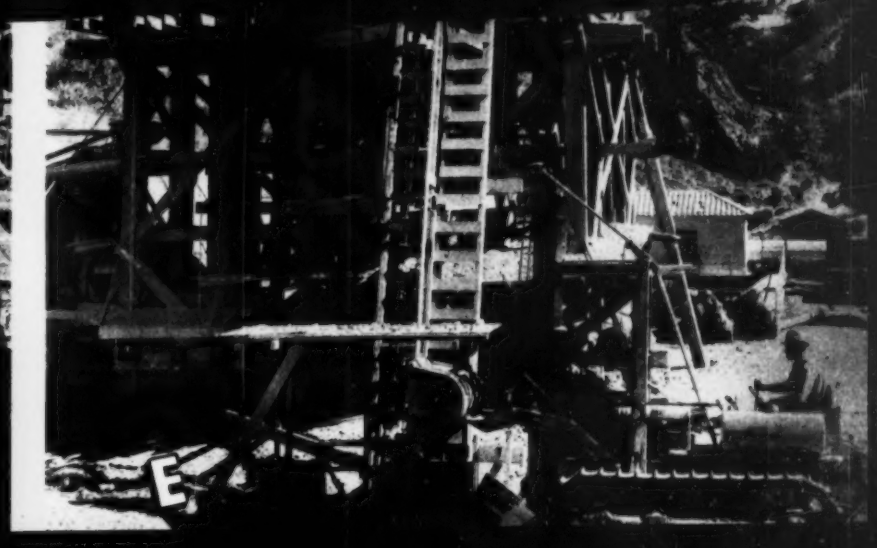
• Leading manufacturers of contracting equipment power their products with "Caterpillar" Diesel Engines or design them for operation with "Caterpillar" Diesel Tractors. "Caterpillar" parts-and-service facilities are the most complete and most widely convenient of their kind in the world. There are wide ranges of "Caterpillar" Diesel Tractor, Motor Grader, Engine and Electric Set sizes.

"CATERPILLAR" DIESEL D4 TRACTOR EQUIPPED WITH HYSTER WINCH AND TRACKSON TRAXCAVATOR WITH BULLDOZER ATTACHMENT

A—Moving earth-and-rock with bulldozer attachment.
B—Tightening guy lines on gravel bunkers with winch.
C—Hauling heavy fuel truck with drawbar hitch.
D—Loading truck with high shovel.
E—Delivering gravel to conveyor with shovel.

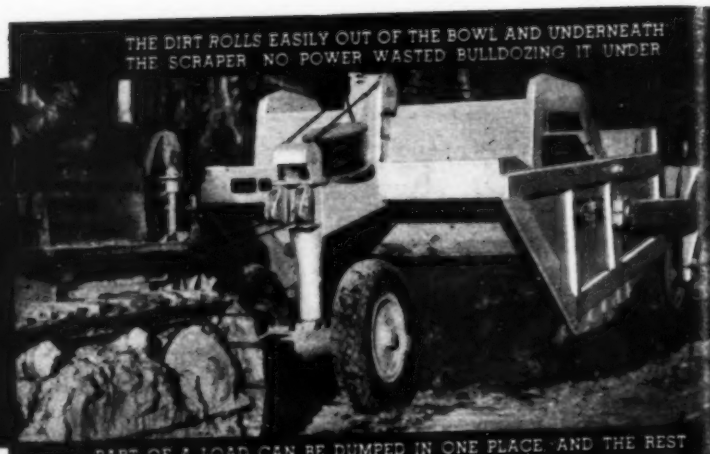
CATERPILLAR

TRACK-TYPE TRACTORS • ROAD MACHINERY
DIESEL ENGINES AND ELECTRIC SETS



TO ELIMINATE SIDE SPILLING OF DIRT WHILE SPREADING OR LOADING THE SIDE PLATES ARE EXTENDED WELL AHEAD OF THE CUTTING EDGE

THE DIRT ROLLS EASILY OUT OF THE BOWL AND UNDERNEATH THE SCRAPER NO POWER WASTED BULLDOZING IT UNDER



LOAD CAN BE DUMPED AND SPREAD ON SIDE SLOPES BECAUSE OF ACCURATE CONTROL WIDE WHEEL SPREAD AND LOW CENTER OF GRAVITY

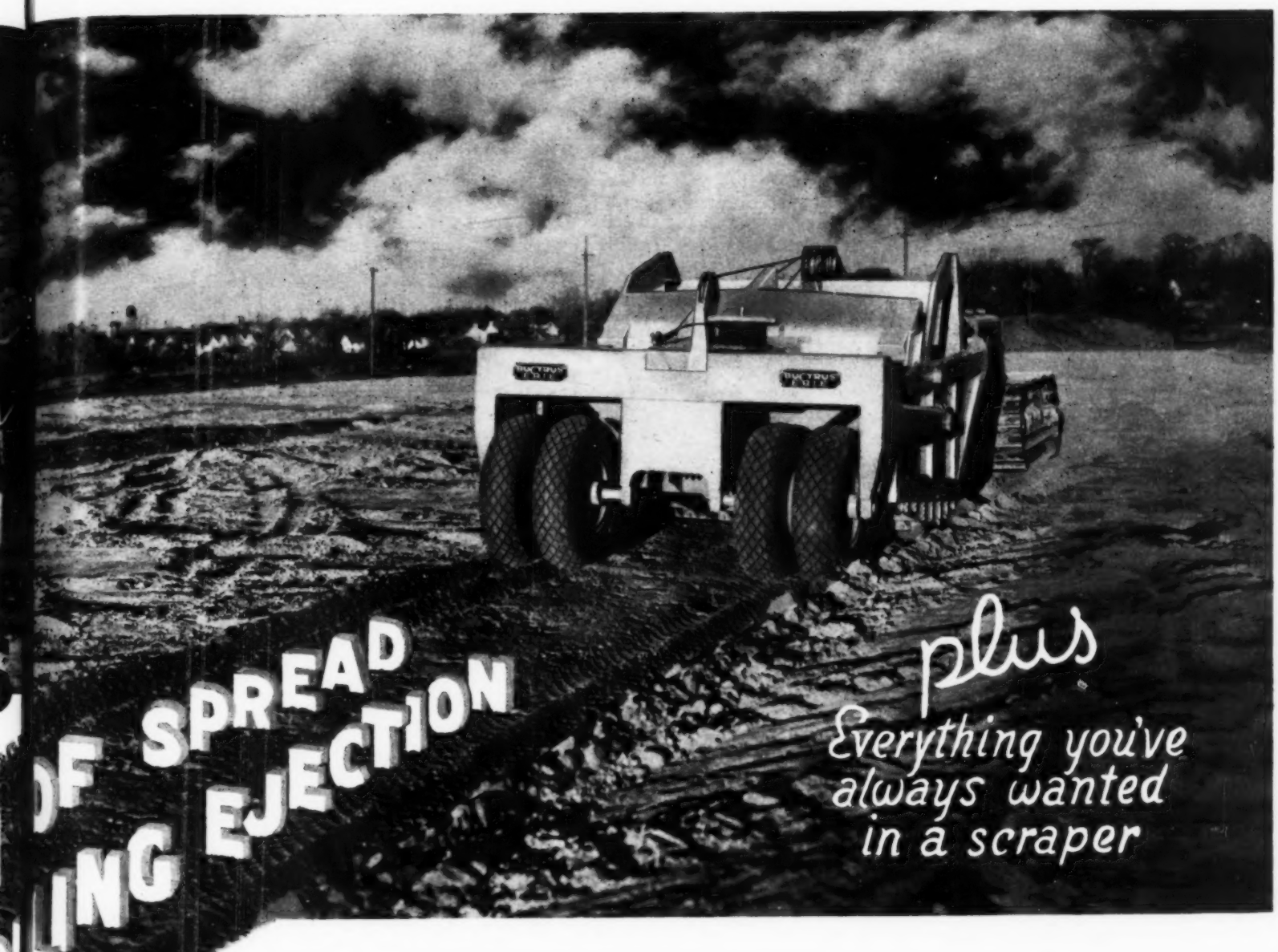
PART OF A LOAD CAN BE DUMPED IN ONE PLACE AND THE REST OF IT DUMPED IN ANOTHER TILTING BOWL IS EASILY CONTROLLED

TWO big features

1 CONTROLLED DEPTH

2 POSITIVE ROLL

BUCYRUS ERIE



YOU get exactly the depth of spread you want with the new Bucyrus-Erie 4-Wheel Scrapers. As dirt is rolled out of the bowl it is levelled off by the cutting edge. Since this cutting edge is fixed in the frame and controlled by a separate line of cable independently of the tilting of the bowl, it maintains the depth of spread you want at all times. ¶¶ You also get positive rolling ejection, by means of the tilting bowl. This bowl is a simple plate which is doubled on the bottom and gusseted at points of wear. It is curved below and behind the dirt and hinged immediately in back of the cutting edge. Controlled by an independent line of cable, the bowl ejects the dirt in a rolling motion when tilted upward. It can be tilted to a nearly vertical position, and this sharp angle of tilt plus the shearing action along the side plates of the frame assures you clean dumping of any kind of material. ¶¶ Of course the new Bucyrus-Erie scrapers have all the other features you want too. There is a complete range of sizes matched to the new line of International TracTracTors. Find out all about them from your nearest International TracTracTor Dealer.

Bucyrus · Erie

SOUTH MILWAUKEE, WISCONSIN

SPADEWORK...

THERE'S simply no getting away from it. If Adolphus Q. Bickle wants to win that tulip award he's after, the only way he will do it is by more and better spadework.

Here at Shell our lubrication men never try to get away from the preliminary digging that cuts the cost of friction in industry. Every day they go out in search of it.

You will find Shell lubrication men in a Detroit machine shop conducting a test run with an improved cutting lubricant . . . in a Carolina paper plant studying the possibility of improving dryer-roll lubrication. Or checking the effect of lubricating oil in relation to exhaust-port carbon formation and operating temperature in a marine Diesel. Or you will find them investigating the reaction of a new type of extreme pressure lubricant on screw-downs on a blooming mill.

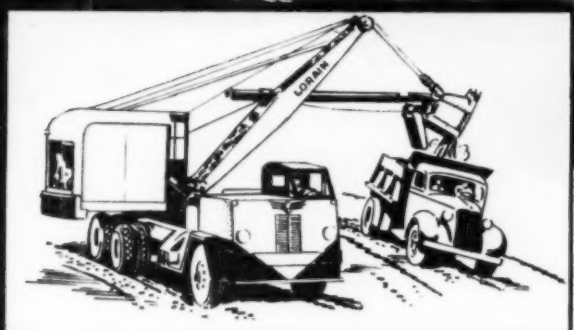
It's this first-hand digging that enables Shell refineries to produce lubricants keyed to the needs of your machines *today.*

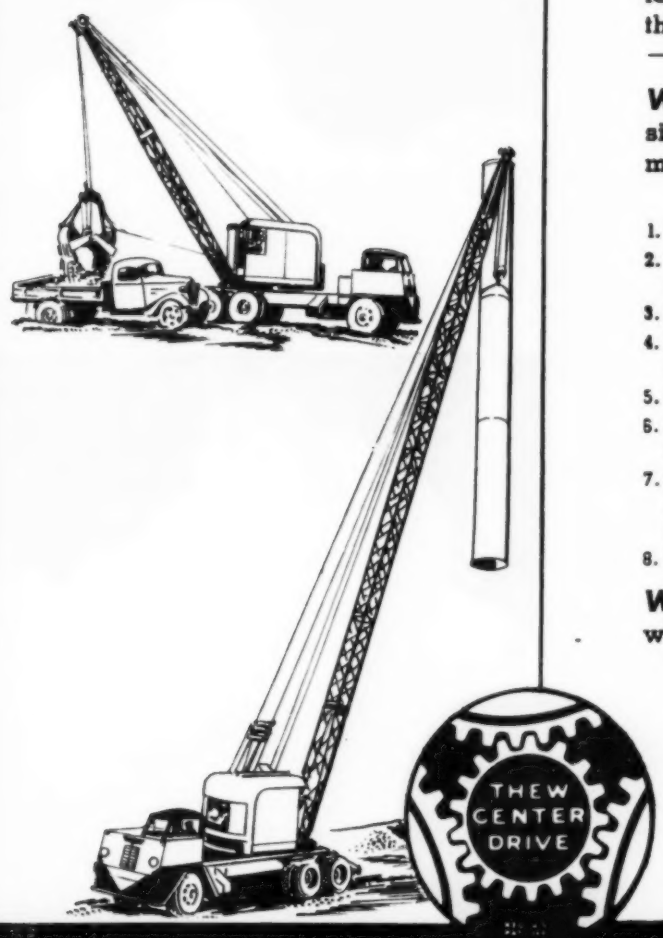
Perhaps Shell can help with your lubrication problem. Why not call in your Shell man today?

SHELL

SHELL INDUSTRIAL LUBRICANTS

MEET THE MOTO-CRANE!





SOMETHING NEW ON WHEELS

WHAT IS IT? First, let's clear the decks by stating that the Moto-Crane is *not* a truck crane. It's new and different in that it offers a complete, integral unit—of crane and mounting—with a mounting which from hub caps to outriggers is designed exclusively as a Crane Carrier. In other words, the Moto-Crane offers you a crane and carrier as one complete package — built by one manufacturer and covered by one standard warranty.

WHAT ARE ITS ADVANTAGES? The Moto-Crane is offered in 5 sizes ranging from light weight to heavy-duty, big-capacity units. All models offer the following advantages—

CRANE CARRIER

1. 3 axle mounting supported on 10 rubber tires.
2. Mounting is built of standard parts available all over the country.
3. Shorter wheelbase for better maneuvering.
4. Special chassis frame design eliminates reinforcing.
5. 10 speeds forward and 2 reverse.
6. Offset cab permits carrying boom in lower traveling position over front end.
7. Rocker arm rear end replaces springs—gives flexibility for road travel — rigidity for operation.
8. Space for groundman, tackle and rigging.

CRANE TURNTABLE

1. Simplified Center Drive direct-to-the-point power application.
2. Balanced to provide the greatest capacities per pound of weight.
3. Steel erector's precision boom hoist, with power control of boom lowering.
4. Pin-connected boom with center sections and straight or gooseneck tips.
5. Cab type tagline which functions efficiently at all boom angles.
6. Winch Head and Third Drum attachments.
7. Convertible to Dragline, Clamshell, Shovel, Backdigger.

WHO MAKES IT? The Moto-Crane is the product of the manufacturer who not only pioneered the first truck crane but developed it step by step to its present day efficiency and acceptance. Universal-Lorain has built more truck cranes than all others combined. The Moto-Crane is no "off-the-cuff" development. It's the outgrowth of 22 years' experience in this specialized field. Complete information on the Moto-Crane is available on request.

UNIVERSAL CRANE DIVISION • THE THEW SHOVEL COMPANY

LORAIN, OHIO

Universal Lorain Moto-Crane

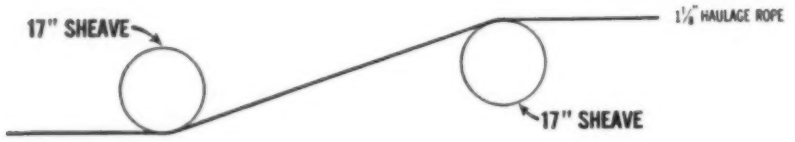
NO JOB TOO SMALL OR SHORT . . . NO JOB TOO BIG OR TOUGH

WHO SAID "Wire Rope Reeving Isn't Important"?

BEFORE

4" rollers at reverse bend. Rope service unsatisfactory.

AFTER



17" sheaves replaced the 4" rollers.

RESULT Rope Service almost Doubled!

This is an *actual* case history. Not an isolated case. But a typical example of what can be and is being done to increase rope life through proper wire rope reeving.

There is nothing complicated about proper wire rope reeving. It's simply a matter of watching the things that are easily overlooked—avoiding reverse bends whenever possible, making sure that sheaves are large enough, that sheave grooves are in proper condition, etc. The additional examples to the right are typical of what can be done. And they pay big in results.

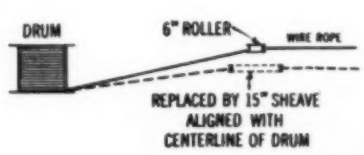
To obtain maximum safety and service from wire rope—watch wire rope reeving. And feel free to consult our local representative—who will gladly make available to you our years of experience with every conceivable kind of reeving problem. His suggestions may point the way to worthwhile savings.

JOHN A. ROEBLING'S SONS CO.
Trenton, N. J. *Branches in Principal Cities*

This advertisement is published in the interest of all wire rope users, to help them obtain greater safety, service and efficiency from their wire rope.

ROEBLING
JAR *Wire Rope*

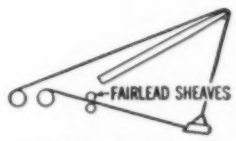
SOME OTHER "REEVING POINTERS" THAT INCREASE ROPE LIFE



These simple changes doubled rope life!

Originally, a 6-inch roller was used, as indicated above, in reeving a hoist. First of all, this roller was too small—causing a sharp bend in the wire rope. Secondly, it was improperly aligned—causing scrubbing action of the rope on the drum. As a result wire rope life suffered.

By simply replacing the 6-inch roller with a 15-inch sheave, and properly aligning this sheave, as shown, excessive rope wear was eliminated. Wire rope life was doubled!

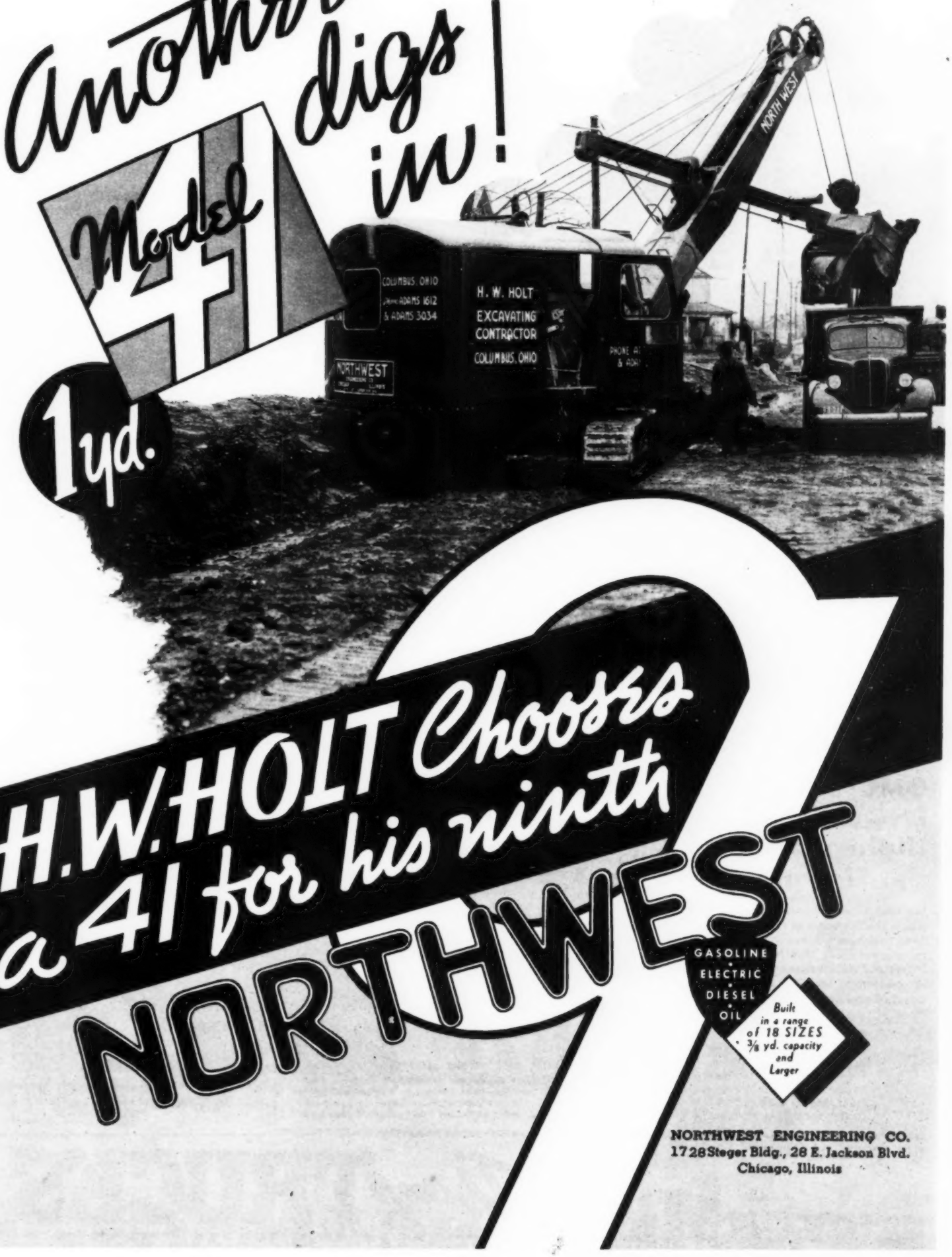


Dragline sheaves replaced —rope life tripled!

An Illinois coal company replaced worn Fairlead sheaves with larger sheaves of harder material. Result—average service of five ropes almost tripled that of five ropes used before.

Ask about ROEBLING "BLUE CENTER" WIRE ROPE . . . *either standard or preformed*

Another Model 41 digs in!



1 yd.

H.W. HOLT Chooses a 41 for his ninth

NORTHWEST

GASOLINE
ELECTRIC
DIESEL
OIL

Built in a range of 18 SIZES
3/8 yd. capacity and Larger

NORTHWEST ENGINEERING CO.
1728 Steger Bldg., 28 E. Jackson Blvd.
Chicago, Illinois

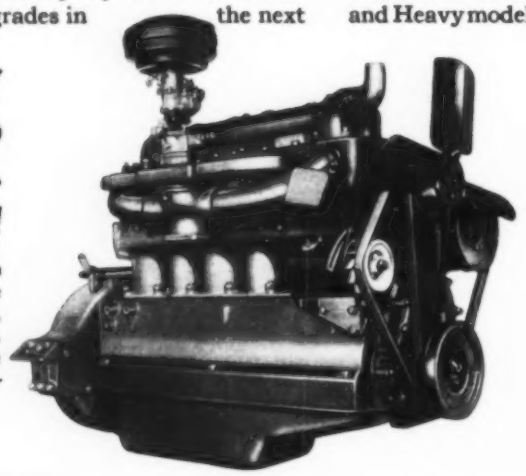
GMC's GREATER PULLING POWER moves Big Loads *Faster!*

The man in the GMC can do more hauling any day, because he's got more pulling power under the hood. When a GMC SUPER-DUTY Engine "leans into the collar" and pulls, there simply isn't another comparable truck built that can keep up with it. GMC owners say they take most grades in the next higher gear than other trucks use, with big savings in time and gasoline. GMCs pull out of the pits easier, get up to speed faster, deliver each load in minimum time. And GMCs are the easiest-handling of all trucks—BALL-BEARING Friction-Free Steering (in all GMC Medium and Heavy models) reduces steering effort as much as 57%!

GMC SUPER-DUTY ENGINES Develop Highest Torque... *. . . Size for Size!*

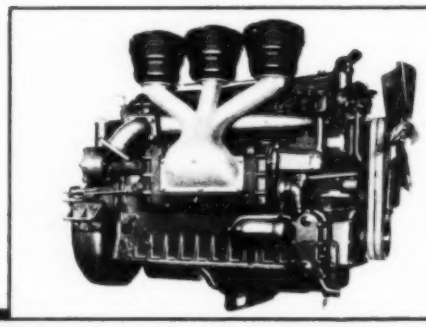
It's easy to see why *no other truck pulls like a GMC* when you compare performance facts. GMC engines score highest in torque, in every engine size from ½ to 15 tons. POWER-PAK Pistons and an exclusive type of combustion chamber explain GMC's unmatched performance and gas economy.

Our own YMAC Time Payment Plan assures you of lowest available rates



NEW 6-CYLINDER 2-CYCLE DIESEL ENGINE

Diesel power is optional in all GMC Trucks over 3-ton capacity. There are 5 different GMC 2-Cycle Diesel engines, including the new 6-Cylinder model for heaviest work. No other Diesel engine on the market develops so much power per pound!



NEW 6-WHEELERS

34 new models, completely engineered by GMC. Available in trailing types, and in dual-drive models for maximum traction on soft ground.

ONLY GMC OFFERS *ALL* THIS *EXTRA VALUE*

SUPER-DUTY Engines with POWER-PAK Pistons • BALL-BEARING Friction-Free Steering in medium and heavy models • SYNCRO-MESH Transmissions (in heavy-duty models) • RIDER-EASE Cabs • SEALED-BEAM Headlamps

THE TRUCK OF VALUE

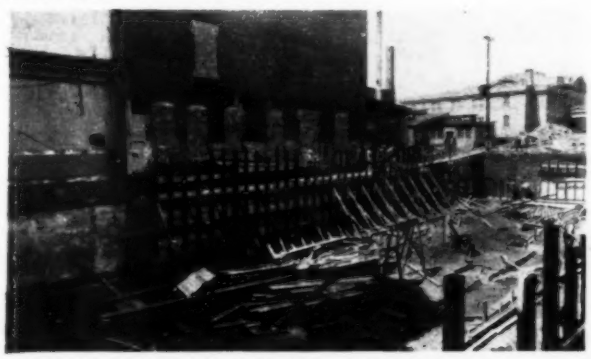
GMC *Dump* TRUCKS

GASOLINE DIESEL

Saving a Building's face
AND ITS FOUNDATIONS, TOO

Placing quick service concrete for the new foundations. The front of the old structure remained.

The face of the old structure was transformed for this modern store front.



Forms were stripped in 36 hours. Quick service concrete avoided continued danger from cave-ins.

Store Building, Salisbury, N. C.
Owner: T. F. Wren
Architect: R. R. Rowe, Chicago, Ill.
Contractor: L. S. Bradshaw & Son, Salisbury, N. C.

IN 66 DAYS LESS TIME AT $1236 LOWER COST

According to the contractor, the efficient, economical accomplishment of this unusual job was made possible by quick service concrete made with Lehigh Early Strength Cement. Three to five times faster than normal cement used under the same conditions, this quick curing was a boon in the face of the problems involved.

Except for the front, which was to be modernized for the new structure, an old building was demolished. Deeper excavation than existed was needed. The front foundations and those of adjacent buildings were left without support. Wall and sidewalk cave-ins threatened. New foundations had to be placed in the shortest possible time. By using Lehigh Early Strength Cement forms were stripped in 36 hours, steel erection and brickwork started at once.

Quick use of concrete saved 66 days speeded up the whole job for occupancy 3 months earlier. Contractor costs for curing and job overhead were $1236 less because of shortened construction time—and the owner got a bonus of 3 months' extra rent.

You, too, can save time and money for any type of concrete operation by using Lehigh Early Strength Cement. In 24 to 48 hours it reaches strength equal to that of normal cement at 7 days—and it makes better, denser concrete. The Lehigh Service Department will gladly answer your questions.

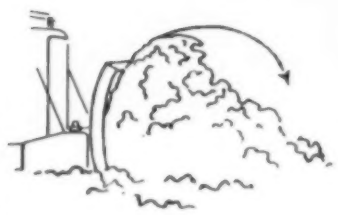
LEHIGH EARLY STRENGTH CEMENT

LEHIGH PORTLAND CEMENT COMPANY

ALLENTOWN, PA., CHICAGO, ILL., SPOKANE, WASH.

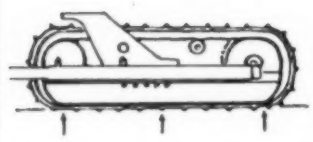
Only the

Blade Rolls the Dirt



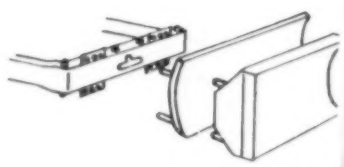
Blade digs its own way in and rolls the dirt ahead — takes less power — moves faster — less strain on tractor — no cylinders needed for down pressure.

Utilizes Full Tractor Power



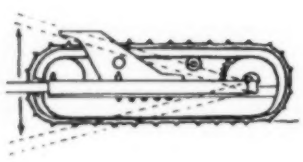
No cylinders to push blade down and tractor up — tractor stays balanced — no tipping — full length of crawlers stay on the ground — full pushing power available!

Interchangeable Blades



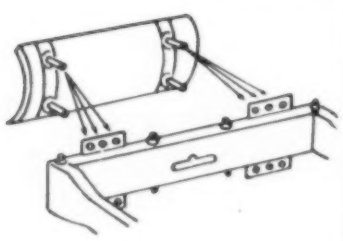
Sidearms and front cross beam standard for both Bulldozer and Trailbuilder — unbolt one blade — back away — bolt on other — quick, easy.

Full Floating Blade



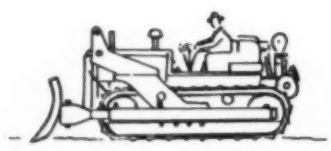
Side arms pivot at drive end of tractor allowing free-swinging action up or down for high lift with cable, deep bite of blade.

Blade Adjustable Horizontally



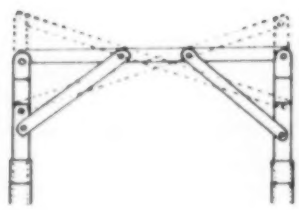
Angle the Trailbuilder Blade to the right — MOVE IT HORIZONTALLY TO THE LEFT — or vice versa — keeps load at dead center — reduces excessive wear and strain on tractor and crawlers!

No Overhead Frames



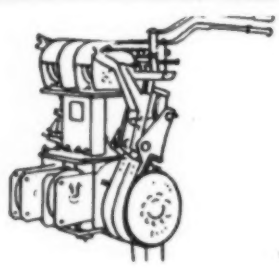
No obstruction overhead — less weight — greater visibility — fewer parts — extreme simplicity.

Adjustable to Any Angle



Trailbuilder blades quickly adjustable right or left to standard desired angles by means of telescoping sidearms.

Full Cable Control



Full cable control with highly efficient, quickly responsive Power Control Unit — easily operated — powerful hoisting action.

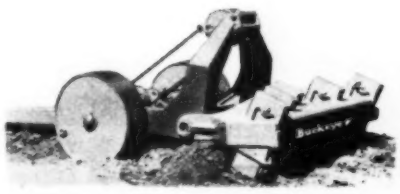
Buckeye Bulldozer *Gives you ALL these advantages!*

BUCKEYE builds the tractor equipment that digs its own way in and keeps the pay dirt rolling ahead for you. Rock, dirt, trees, underbrush, mud — up, down — over and around — it's all in the day's work for these huskies. Powerful sidearms and front cross beam push brute blades that roll the load ahead with the least power — cable control gives lightning lift and power to spare — no extra equipment needed to create down pressure — extreme simplicity — single or double drum power control units with adaptors for different tractors — quickly attached.

When you want to move earth and move it in a hurry, you need Buckeye Bulldozers, Trailbuilders, Rippers and Power Control Units. And when each day's work is done, you'll see real progress, see why it pays to have Buckeye on the job. See now about putting this line of profit-makers to work for you.

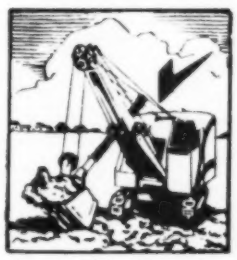
BUCKEYE TRACTION DITCHER COMPANY
Findlay, Ohio

Representatives in Principal Cities



Buckeye Cable-Controlled Ripper

Buckeye

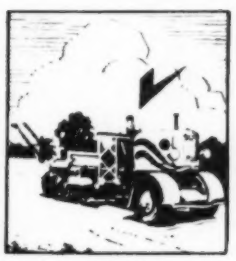


Convertible Shovels .

Ditchers . . . . . .

Road Wideners . . .

R. B. Finegraders . .

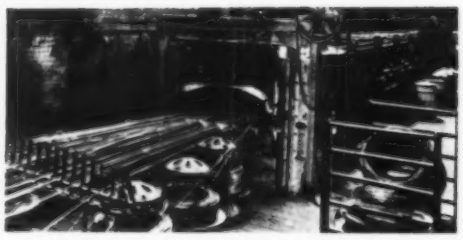


Surface Graders . . .

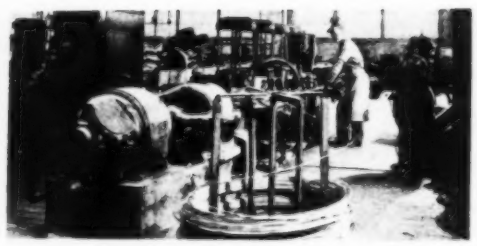
Spreaders . . . . . .

"Sure I Can Prove Wire Ropes Are NOT All Alike! Look . . ."

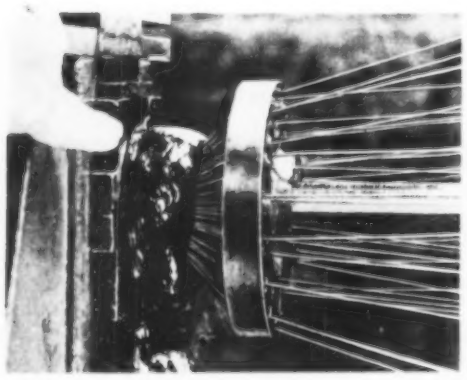
Macwhyte Salesman: It's true, Mr. Buyer, that wire ropes LOOK alike. But you don't buy LOOKS, you want PERFORMANCE. So let me take you behind the scenes and find out what performance is made of . . .



Mac: *You'll find, in making steel,* few companies use exactly the same kind of ore, or the same method of smelting. In heat treating (above) and in baking, temperatures vary, too. From the very beginning wire ropes are made differently. Then . . .



Mac: *You'll discover also that few manufacturers have exactly the same specifications for making wire ropes.* Few use identical dies for wire drawing (above), probably none of them use the exact number of drafts . . .



Mac: *You'll learn that the way a rope is "closed" and lubricated* (above) makes a lot of difference in performance. Few companies use the same procedures, or the same lubrication . . .

Mac: So, from just a few operations, you can see why wire ropes actually are very different. After years of experience and laboratory research we've produced our own formula for making better wire rope. Ask any user . . . he'll tell you Macwhyte gives performance second to none.

BUY MACWHYTE AND GET ALL 3!

1 Laboratory tested, field proved wire rope . . . made from the finest steels, made for the specific job. Field proved on countless jobs.

2 PREformed . . . to give you much longer service, and lower your wire rope costs.

3 With THE Internal Lubrication . . . a special Macwhyte lubricant that covers EVERY WIRE and strand, gives REAL protection where it's needed most: against internal friction and corrosion.

NO. 449-A

MACWHYTE COMPANY, Kenosha, Wis. Manufacturers of Wire Ropes and Braided Wire Rope Slings for every use. (Distributors throughout the U. S. A.) New York . . . Pittsburgh . . . Chicago . . . Ft. Worth . . . Portland . . . Seattle . . . San Francisco

GENERAL CATALOG listing over 1000 ropes with information on ordering, care, and the use of wire rope, available on request.

MACWHYTE
Whyte Strand
PREformed
WIRE ROPE

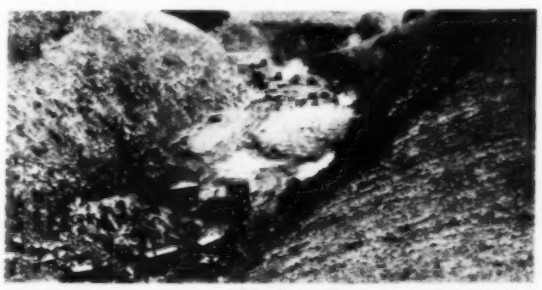
LABORATORY TESTED FIELD PROVED

PLUS INTERNAL LUBRICATION

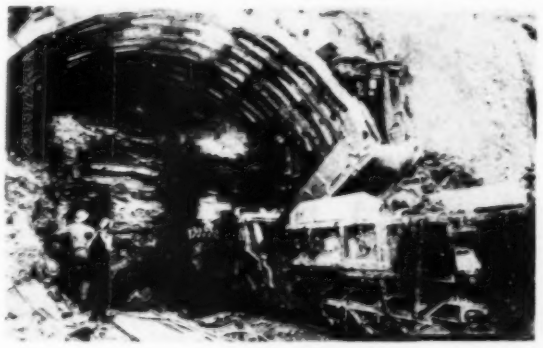
Blasting the way for the "ROAD of TOMORROW" *with* ATLAS Explosives!

Drilling before placing a charge of Atlas Dynamite in one of the cuts.

A shovel eating its way through well broken rock.



Cutting through a mountain.



West Portal, Allegheny Tunnel.

OVER a *million* pounds of Atlas Explosives have already been used in blasting the way for the Pennsylvania Turnpike—the "Road of Tomorrow—Today." Mountains are "whittled down" or "holed through"—valleys filled up or spanned—to speed the nation's transportation in peace time and, if necessary, for national defense.

This great new highway, however, is but one example of the use of Atlas Explosives and Atlas Methods in important construction jobs. Wherever explosives are used, Atlas offers the materials, the methods, and the experience that contractors are looking for. Get in touch with the Atlas Representative!

Looking from West Portal, Blue Mountain Tunnel.
Kittatinny Tunnel in background.

A close-up of East Portal of Kittatinny Tunnel.

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

OFFICES

Allentown, Pa.	Houghton, Mich.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
Boston, Mass.	Joplin, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Butte, Mont.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
Chicago, Ill.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.
Denver, Colo.		Pittsburg, Kansas	Seattle, Wash.	

ATLAS

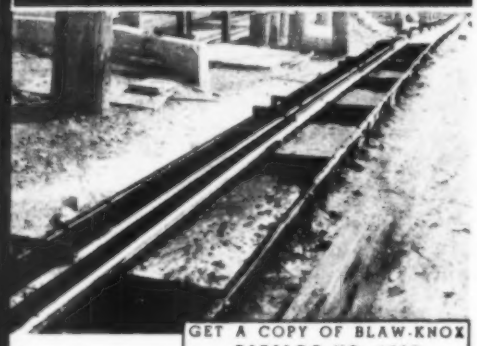
EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

"HOW DO I MAKE MONEY ON THESE SMALL JOBS?

Why—I have a set of BLAW-KNOX STEEL FORMS which will build most any cross section I bid on. Steel gives a nice, dense, smooth finish—expensive hand finishing unnecessary.

NATURALLY MY COSTS ARE LOW."



GET A COPY OF BLAW-KNOX CATALOG NO 1527

23

BLAW-KNOX

BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Street and Sidewalk STEEL FORMS

Built for maximum speed and accuracy in measuring AGGREGATES, CEMENT AND WATER, Blaw-Knox Weighing Batchers are standard equipment in widespread use by road contractors, for general construction, material yards, and ready mixed concrete plants. They satisfy all modern specifications. Furnished for manual or automatic operation.

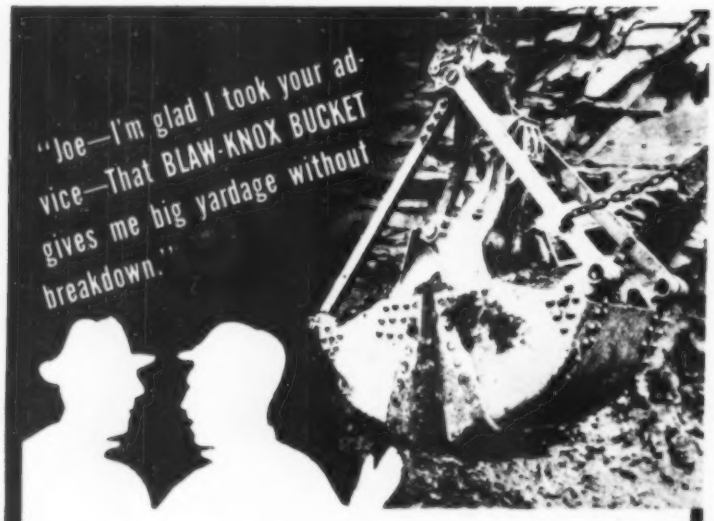
The reliability of Blaw-Knox Weighing Batchers is acknowledged by thousands of users. Send for catalog No. 1566.

18

BLAW-KNOX

BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa

Weighing Batchers



● Contractors know that the proper use of modern steels and alloys at critical points is their assurance of long uninterrupted service when they buy a Blaw-Knox Bucket.

If you aim to increase yardage and efficiency, to reduce maintenance costs and prolong the life of your buckets—investigate Blaw-Knox Buckets for all kinds of digging and rehandling Send for Blaw-Knox Bulletin No. 1561.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PENNA.
Offices and Representatives in Principal Cities

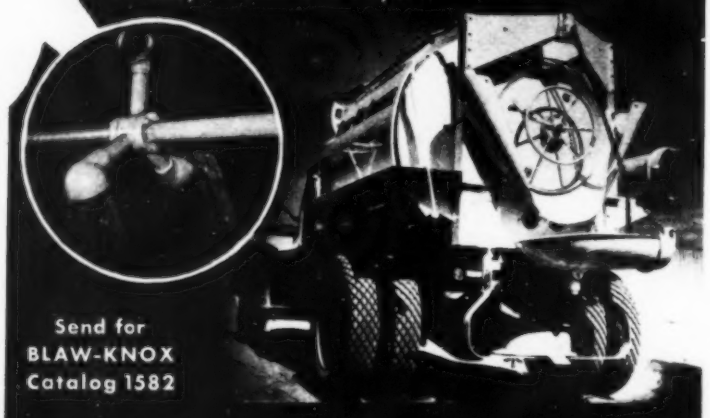
BLAW-KNOX

Clamshell BUCKETS

FAST WATER!

"MAN... That new WATER IMPELLER in BLAW-KNOX TRUKMIXERS puts water into the batch in one-third the time formerly required."

The new, fast water impeller that won't clog; an accurate and dependable water measuring system; superb mixing action—and assurance of dependable continuous operation make Blaw-Knox Trukmixers the popular choice, and the practical buy for you. Study these features before you decide.



Send for BLAW-KNOX Catalog 1582

BLAW-KNOX

BLAW KNOX DIVISION OF BLAW KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Agitators and TRUKMIXERS

Stripped of all unnecessary weight by the use of modern steels, plus the latest mechanical features in excavator design, LIMA shovels, draglines and cranes are pushing forward all along the construction and material handling fronts, establishing new records for big production and low cost operation. LIMA excavators are modern throughout. They qualify to meet the toughest kind of assignments. If you have a tough job coming up, turn it over to a LIMA and know that you have the finest excavator that money can buy and one that will complete the job with a profit.

LIMA LOCOMOTIVE WORKS, INCORPORATED, Shovel and Crane Div.

NEW YORK - 167th St. and Sedgwick Ave. NEWARK, N. J. 317 Frelinghuysen Ave. DALLAS 1304 McKinney Avenue MEMPHIS 77 McCall Street SAN FRANCISCO 1232 Hearst Bldg.
LOS ANGELES 5001 Santa Fe Ave. SEATTLE 1932 First Ave. South PHILADELPHIA 1744 Sedley Avenue
Claire Osborn Equipment Ltd., Montreal
Tyee Machinery Company, Vancouver, B.C.

THERE'S NO SECRET ABOUT PROMPT SERVICE

When you call on Bethlehem for reinforcing steel, you've gone a long way toward getting the material you need when you need it.

Bethlehem has fifteen warehouses, strategically situated in major distribution centers. Each one is ready to speed along your order for reinforcing bars, welded wire fabric, bar mats and other steel building products. Each one is manned by a staff trained to give efficient attention to all orders regardless of their size.

Before you start work on your next contract, get in touch with the Bethlehem warehouse nearest you. You'll find it's an excellent way of avoiding the possibility of having to pay heavy penalty clauses due to delayed shipment of materials.

Bethlehem Steel Company, General Offices: Bethlehem, Pa. Warehouses: Atlanta, Baltimore, Boston, Buffalo, Chicago, Danville, Pa., Detroit, Johnstown, Pa., Los Angeles, New York, Philadelphia, Pittsburgh, St. Paul, San Francisco, Seattle.

BETHLEHEM STEEL COMPANY

"...this modern paving equipment is making a fine operating record with GULF QUALITY LUBRICANTS"
...says Superintendent on this Turnpike Paving Job

This modern dual drum paver is typical of the up-to-date equipment used by paving contractors on the Pennsylvania Turnpike. This contractor safeguards the efficient operation of these units with Gulfpride Oil for motor lubrication, Gulf High Pressure Grease for pressure fittings, and Gulf Lubcote No. 1 for open gears.

"We play safe... and follow the Gulf Engineer's recommendations to the letter."

"WHEN we started this paving job, we took a tip from the many Turnpike contractors who were using Gulf products and standardized on Gulf quality lubricants from the start," says this superintendent. "We feel that our fine operating record is due in large part to the efficiency of our lubrication."

If you want the safe, efficient lubrication so many of the Turnpike contractors have enjoyed, here's the way you can get it: Ask the Gulf engineer to recommend the proper lubricants and fuels for each piece of equipment you are using. His recommendations are based on broad experience and knowledge gained through daily contacts with operating problems in the field. His one aim is to help you insure efficient operation with low maintenance costs for your equipment.

Gulf quality lubricants and fuels are quickly available through more than 1100 Gulf warehouses in 30 states from Maine to New Mexico. Write or phone your nearest distributing point today.

Finishing machines like this will give the roadbed of the Pennsylvania Turnpike the fine surface characteristics which will make safe, fast driving possible. Note the application of Gulf High Pressure Grease to pressure fittings.

GULF

GULF OIL CORPORATION · GULF REFINING COMPANY
GULF BUILDING, PITTSBURGH, PA.

The Shullo Construction Company, of Akron, Ohio, is paving 7.87 miles of the Pennsylvania Turnpike between Husband and the east portal of the Laurel Hill Tunnel. To avoid operating difficulties, this well known contractor has standardized on Gulf quality lubricants for the wide variety of equipment used on this important paving job.

To the Contractor

who takes PRIDE in his work

40-5

YOU can either do the job to "get by," or build a road to *last*, to be of real service, to stand as a testimonial to your skill, and integrity.

The Barber-Greene Tamping-Levelling Finisher, not only lays a level surface, it compresses the material to a uniform density, even over the low spots. The compaction is done by the *Finisher*, not by *damaging traffic*.

Spot samples frequently fail to disclose inaccurate proportioning or incomplete mixing, as they may include large enough areas to average out these inconsistencies. The B-G Mixer delivers an accurately proportioned homogeneous mass that not only passes inspection, but does not contain even the very small segregated masses that cause *spot* failures, which eventually ravel into *road* failures.

B-G Roads are built for service. B-G Mixers and Finishers are built for Contractors who take pride in their work.

The real "pay-off" comes in the costs. The Barber-Greenes not only do the job cheaper, they eliminate the need for costly job corrections.

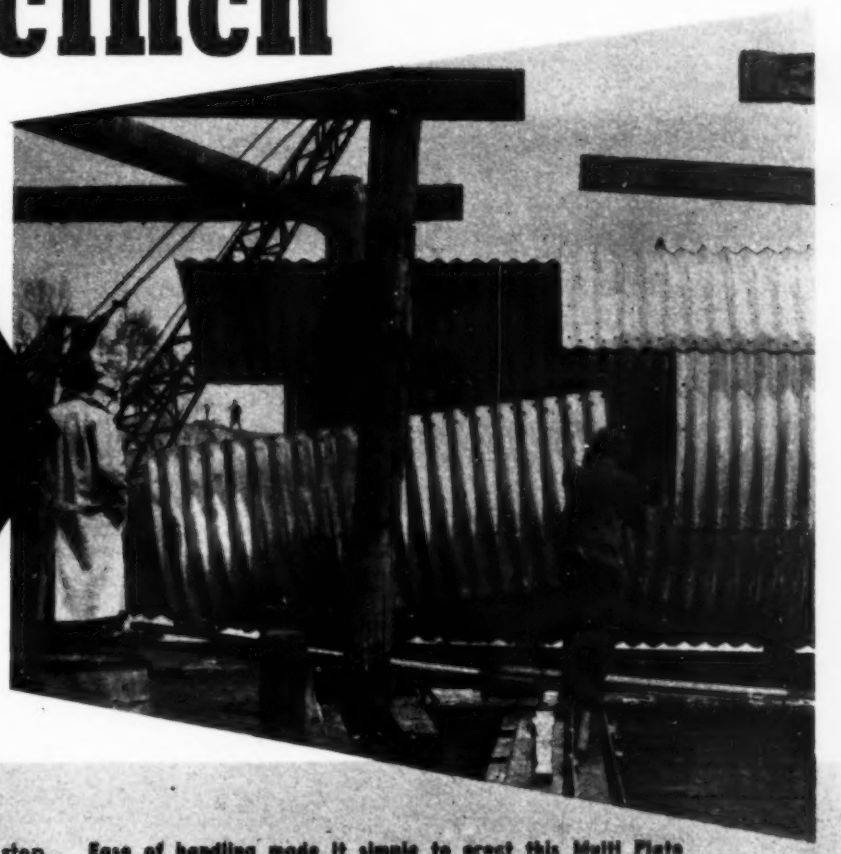
BARBER-GREENE

STANDARDIZED MATERIAL HANDLING MACHINES

AURORA ILLINOIS

BUILDING THIS SLUICEWAY was no cinch

. . . YET SEE HOW ARMCO MULTI PLATE SIMPLIFIED THE JOB



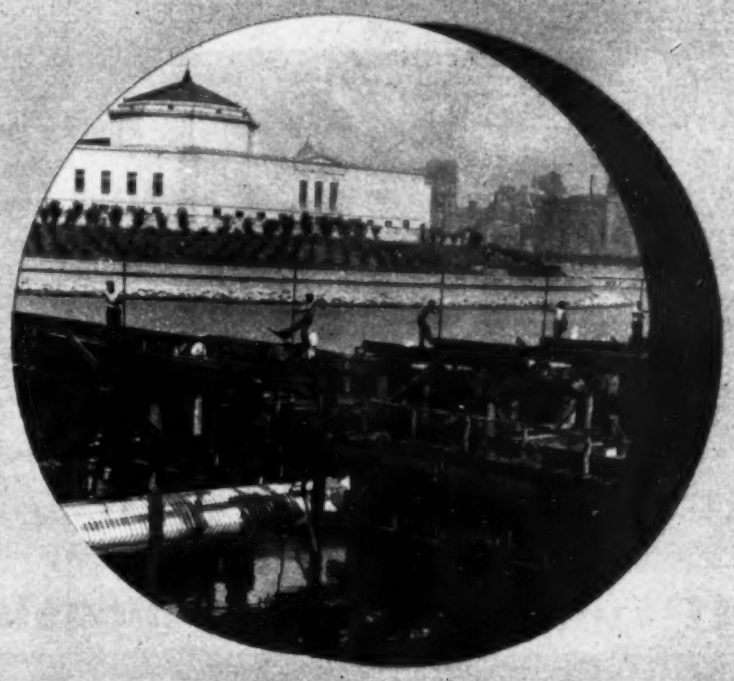
THE PROBLEM: To construct a sluiceway as the first step in replacing a wooden bridge with a permanent earth causeway from island to mainland. This to serve as an equalizer between lake and lagoon waters at the site of the 1933 World's Fair. Installation of the 327 foot structure was complicated by the necessity for erecting and placing in 30 feet of water. Ease of handling was important.

THE SOLUTION: Experienced engineers decided on ARMCO Multi Plate Pipe as the safe, practical answer to the problem. Their choice was greatly influenced by the economy and ease with which the sturdy plates could be erected as well as the structural safety factor of the flexible, corrugated design. Here's how they did it:

The easily-handled ARMCO Multi Plate sections were assembled above water on a special trestle composed of double pile bents on 18-foot centers. Then the completed structure was lowered onto a prepared bed by means of 18-foot screws attached to the top of the plates. The pipe was then covered with 28 feet of hydraulic fill.

While this installation is unusual, ARMCO Multi Plate brings similar benefits under ordinary conditions. Use Multi Plate Pipe or Arches to speed the work and provide safe strength for stream enclosures, bridges, large sewers or special drainage structures. You'll save time and money. Write us for complete information. ARMCO DRAINAGE PRODUCTS ASSOCIATION, 5048 Curtis St., Middletown, O.

Ease of handling made it simple to erect this Multi Plate structure above water and on a relatively common trestle. No heavy, expensive equipment or skilled labor was needed.



The Multi Plate was lowered to a prepared bed by 18-foot screws attached at intervals to the top plates of the structure. Note the old bridge and the trestle supporting the pipe.

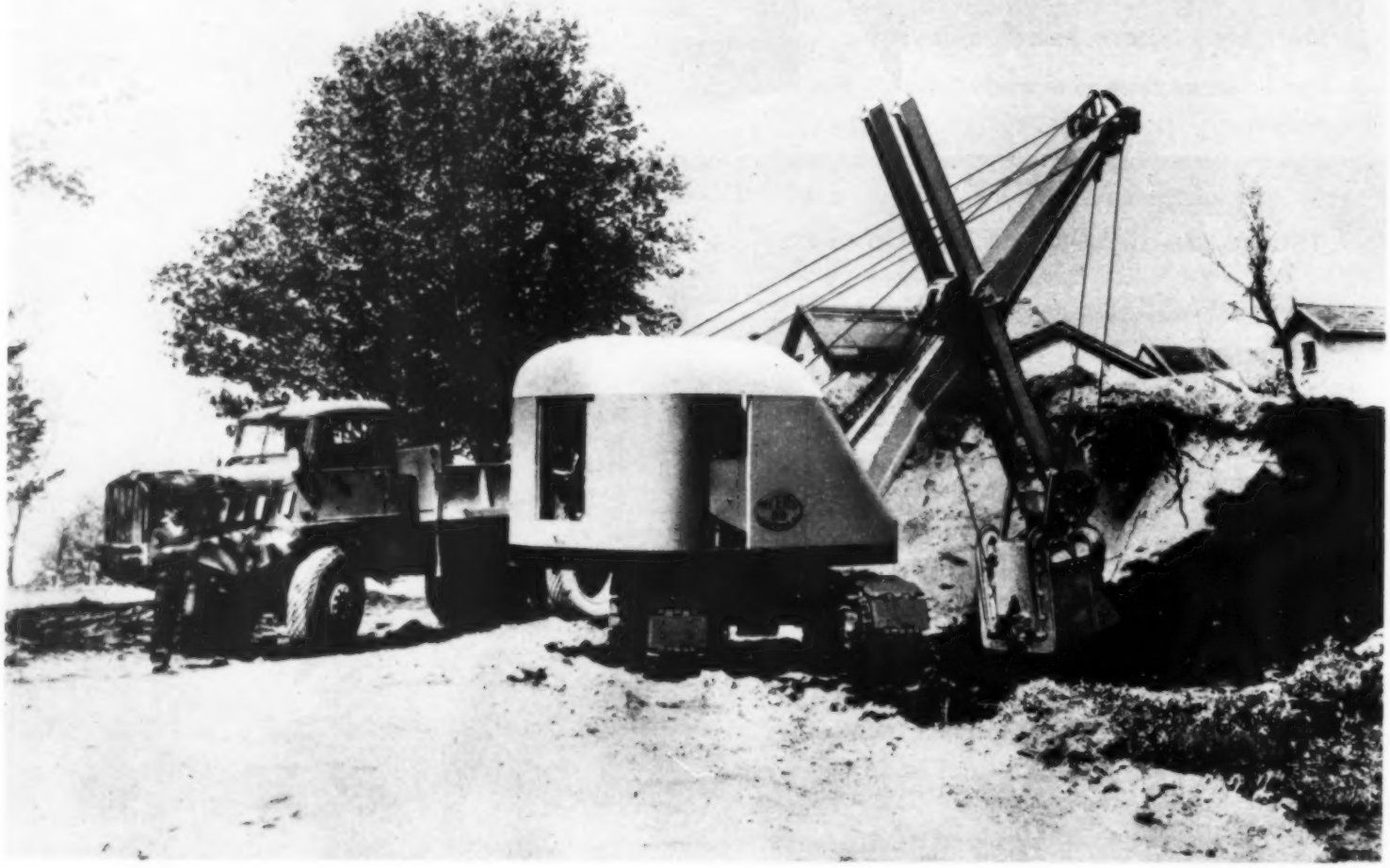
ARMCO MULTI PLATE

A TYPE OF PRODUCT ORIGINATED AND DEVELOPED BY ARMCO ENGINEERS

SPEED

. . . to keep truckers "humping."

. . . to make extra yardage on easy going.
. . . to get each full dipper up and out by the time it swings over to dumping position.
. . . to retract twice as fast as it crowds.
. . . to dump sticky materials with vigorous crowd-retract shake.
. . . to drop more dollars in your pocket more quickly.



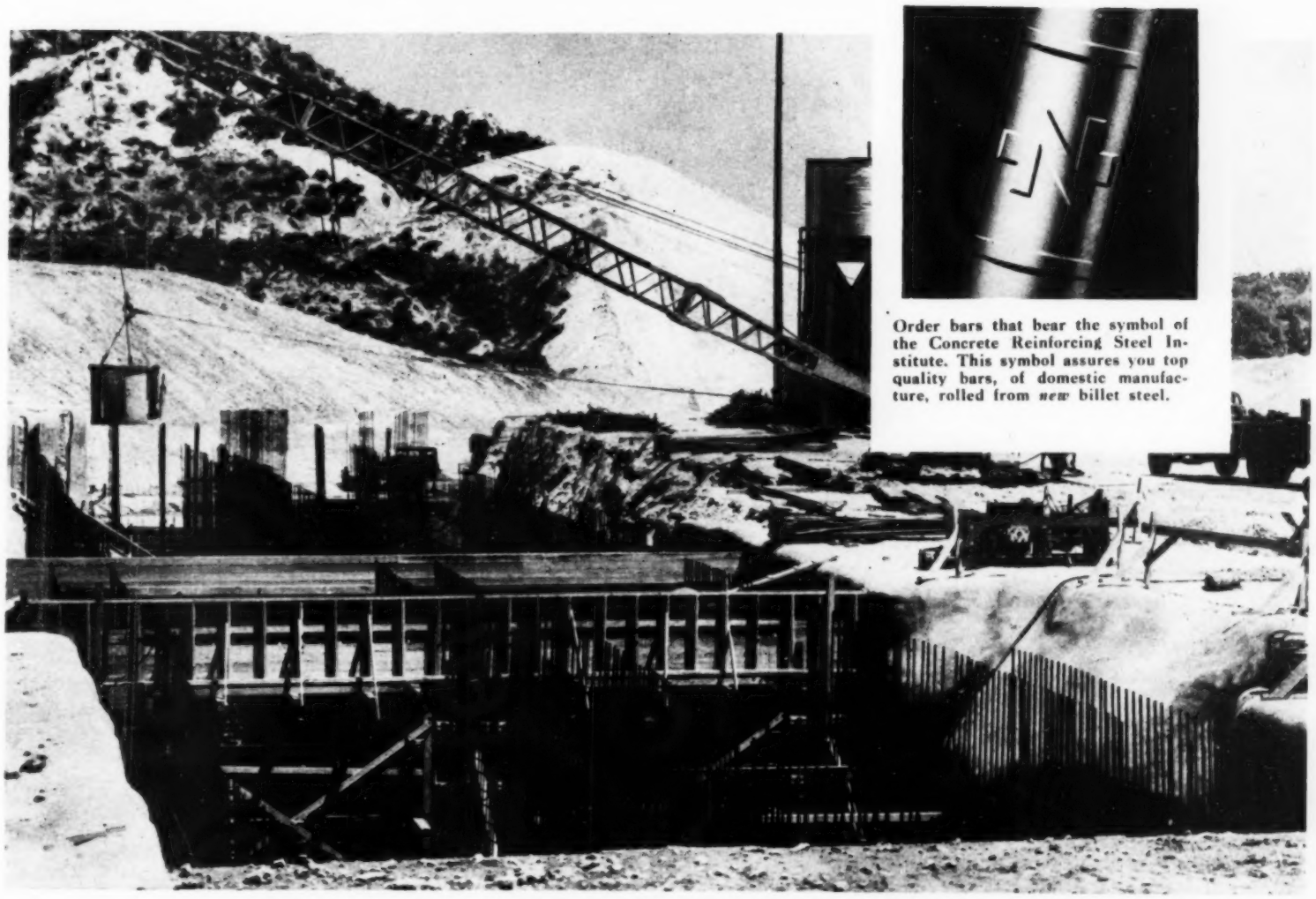
11 Fully convertible models in 3/8 - 1/2 - 5/8 - 3/4 yd. sizes

BYERS

RAVENNA, OHIO

SPECIALIZING IN *Portable* SHOVELS AND CRANES

WHERE'S YOUR NEXT JOB?



Order bars that bear the symbol of the Concrete Reinforcing Steel Institute. This symbol assures you top quality bars, of domestic manufacture, rolled from *new* billet steel.

Wherever it is...you can get bars

On time

YOUR next job may be across the street—or it may be hundreds of miles away, at what may seem an inaccessible spot. In either event, you won't be far from a distributor of U·S·S Concrete Reinforcing Bars. Our distributors have ample stocks on hand, with facilities for cutting and bending of bars should you desire it. Rush job or not—it's worth a lot to know that you can turn to a convenient source of supply that won't keep you waiting for bars—that will deliver them "Johnny on the spot" when and where you want them.

There's another good reason for getting bars from your U·S·S distributor. When you specify U·S·S, you get bars that are cleanly and accurately rolled. And when these bars bear the symbol of the Concrete Reinforcing Steel Institute, you can be sure that they are highest quality—rolled only from *new* billet steel.

Want good bars? On time? You get both when you specify U·S·S.

USS

CONCRETE REINFORCING BARS

Manufactured by

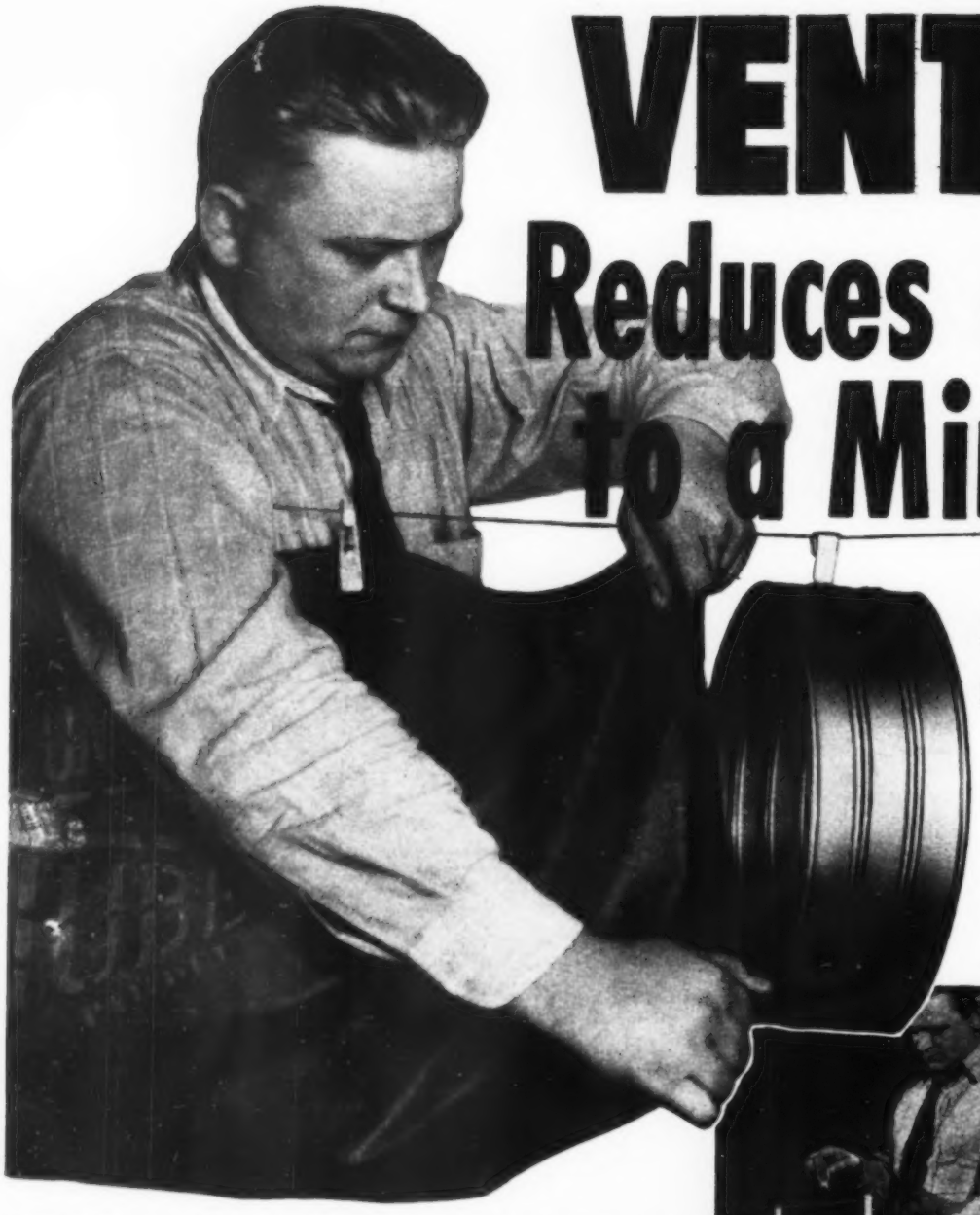
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
United States Steel Export Company, New York

UNITED STATES STEEL

VENTUBE*

Reduces Air Loss to a Minimum!

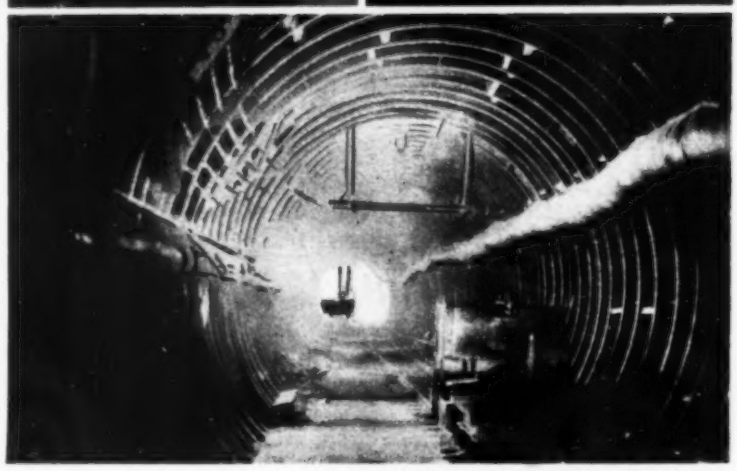
Time-Saving Detachable Couplings make Joints Air-Tight



1 **LEFT:** Here's the first step in coupling. Notice that the tubing is being pulled over the end of the detachable coupling.

2 **BELOW LEFT:** Next, the band is easily and quickly slipped over sleeve of the tubing.

3 **BELOW RIGHT:** Pressure of the hand on the clamp completes the job. The other section of the tubing is attached to the coupling in the same manner.



100% Blower Capacity! That's what a recent test showed that "Ventube" delivers. This flexible, rubberized ventilating duct hangs straight as a string without kinks or bulges to impede the smooth flow of fresh air through its interior. Joints are made air-tight with patented "Ventube" couplings made of interlocking rings of special spring steel (two sections of "Ventube" can be quickly and easily joined in ten seconds, as illustrated above).

"Ventube" is amazingly tough and durable, too! It is made of extra-heavy long-fibered cloth woven to high Du Pont standards. The fabric and the thread that go into the making of "Ventube" are first processed with a special treatment to resist fungus growth. Then this pre-treated fabric is impregnated and coated with rubber on both sides to resist acid, water, gases and rot! "Ventube" is balanced in strength in both the warp and filler, so it can stand tearing and rupture.

"Ventube" is light—easy to handle. Goes around corners and up and down steep inclines. Gets right up to the heading and slides back quickly and easily when blasting. And brings clean, fresh air into your deepest working with only the aid of a motor-driven fan of proper capacity!

We'll be glad to submit estimates on jobs you're figuring. Write Du Pont to-day!

PHOTO COURTESY OF YOUNGSTOWN STEEL CAR CORP.

Here's "Ventube" being used in the North Metropolitan Relief Sewer at Chelsea, Mass.

DU PONT ON THE AIR—Listen to the "Cavalcade of America" every Tuesday, 9 P. M. E. D. S. T., over the National Broadcasting Company Networks.

DU PONT
VENTUBE
THE FLEXIBLE VENTILATING DUCT

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
"FABRIKOID" DIVISION • FAIRFIELD, CONN.

"VENTUBE" is Du Pont's registered trade mark designating its rubber impregnated flexible ventilating duct.

● This roomy, compact powder bag is made of the same sturdy material as is "Ventube." The seams are sewed as tough as rawhide—and the fabric is coated and impregnated with thick, resistant rubber. Du Pont powder bags are available in several sizes. Write for sizes and prices.

WHAT'S YOUR PUMPING PROBLEM?

Here is the Answer

Novo 4" Self-primer on bridge job. Capacity: 40,000 GPH.

THE right answer for de-watering is Novo Self-priming Centrifugal Pumps and Novo Diaphragm Pumps.

NOVO SELF-PRIMERS have a hydraulic air seal on the impeller shaft, accomplished by simply submerging the impeller in water under pressure from the discharge. Water is kept from leaking around shaft by a greaseless packing that requires no attention. There are two adjustable wear-plates, one on either side of the impeller. You can get at wear-plate and impeller by just removing outer pump plate.

These features mean long, efficient performance and easy adjustment when it becomes necessary. 10 sizes, 1½" to 8", gasoline and electric powered.

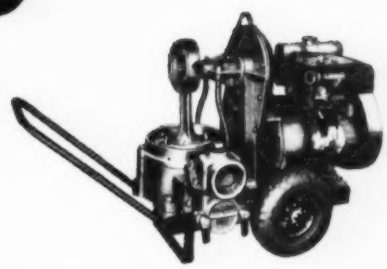
NOVO DIAPHRAGM PUMPS have been modernized in design but still operate on that good old fool-proof principle that you know will not fail you in the pinches where dirty, mucky, or sand-ladened water is to be handled.

Novo Diaphragm Pumps are the lift-and-force type that have been designed for greatest pump efficiency and easy portability without the excess weight you use to think necessary in diaphragm pumps. Gears and bearings flooded with oil. Clean-out plate on discharge. Send the coupon.

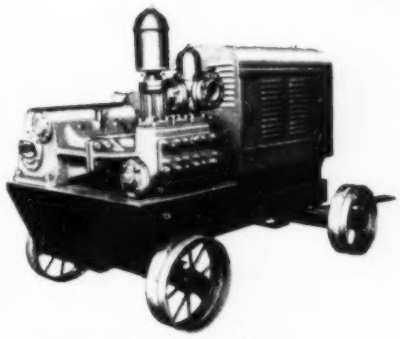
NOVO ROAD PUMPS (Triplex Power Pumps) have a high efficiency never before attained in pressure pumps of this type. The reasons are: There are only two reductions between the power unit and pump crankshaft. A multiple roller chain and herring-bone gears (running in oil) transmit power efficiently and quietly. Crankshaft and pinion shaft are mounted on large roller bearings. The whole pump is streamlined with a low center of gravity. Sizes: 80 GPM at 500# pressure, 100 GPM at 600#, 125 GPM at 500#, 150 GPM at 400#.

All of these Novo Pumps comply with the A. G. C. Standards and bear their rating plate.

Novo 2" Self-primer, 10,000 GPH, with pneumatic wheels and hoisting sling. (One of 10 sizes available.)



Novo lift-and-force Diaphragm Pump built in 3" and 4" sizes, 3,000 and 6,000 GPH respectively.

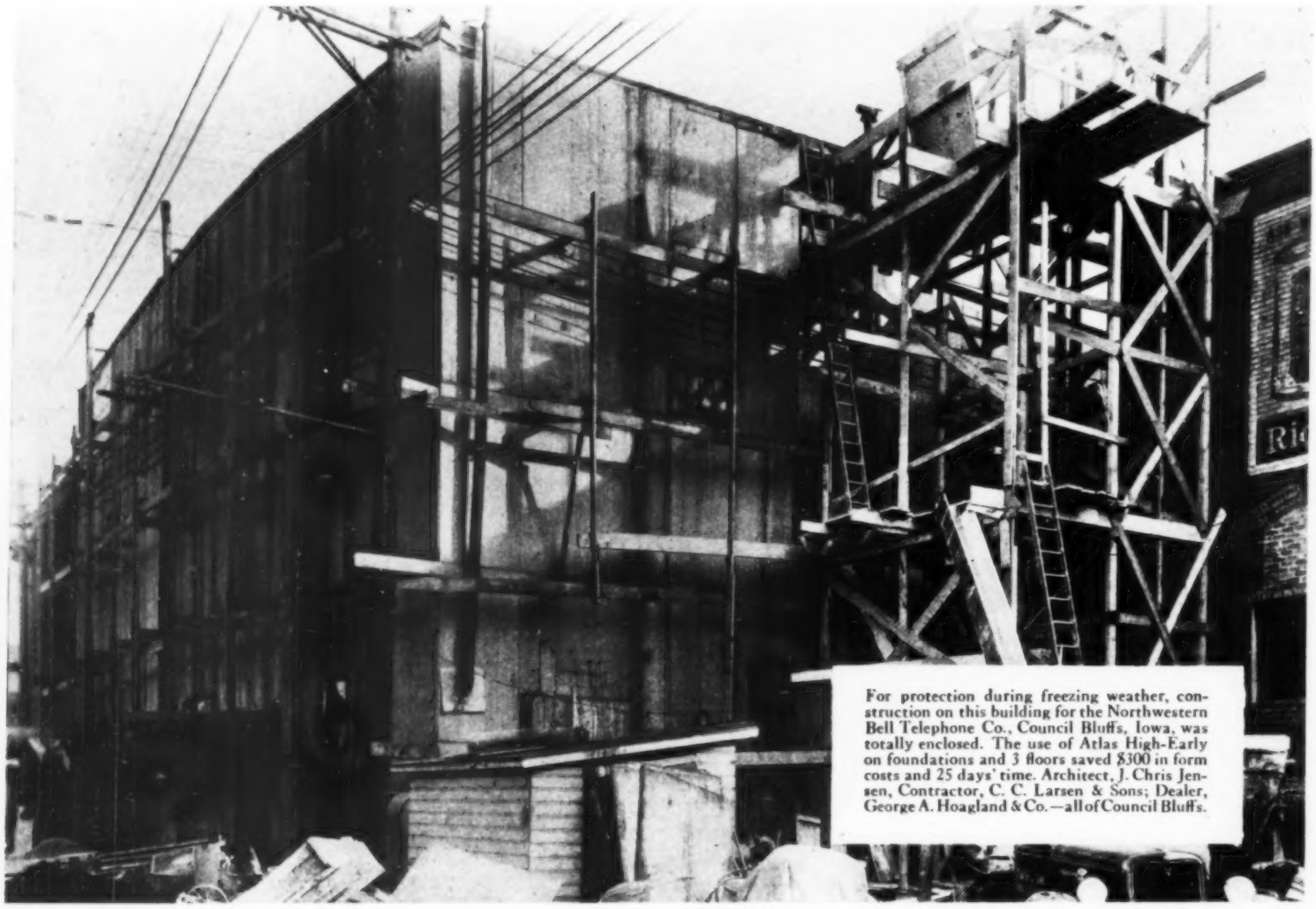


Novo Road Pump (Triplex Power Pump). Highest efficiency — easy portability.

NOVO ENGINE COMPANY
LANSING, MICHIGAN

NOVO ENGINE COMPANY, 214 Porter St., Lansing, Mich., U.S.A.
Send information on:
NOVO Self-primer ☐ NOVO Diaphragm ☐ NOVO Road Pump ☐
Name.....
Address.....
City.....
State.....

SAVED... 25 DAYS AND $300



For protection during freezing weather, construction on this building for the Northwestern Bell Telephone Co., Council Bluffs, Iowa, was totally enclosed. The use of Atlas High-Early on foundations and 3 floors saved $300 in form costs and 25 days' time. Architect, J. Chris Jensen, Contractor, C. C. Larsen & Sons; Dealer, George A. Hoagland & Co.—all of Council Bluffs.

Northwestern Bell Telephone Company Building, Council Bluffs, Iowa, ready for occupancy nearly a month sooner, thanks to Atlas High-Early cement!

CONCRETING of this building could not wait for spring. Work had to be rushed during some of the coldest weather you'll find anywhere. The superstructure was actually concreted in temperatures which were as low as 18° below zero, and never above freezing.

So, the time needed for protection and curing promised to be long and therefore costly. However, the architect found a way to speed construction and keep costs down. He specified Atlas High-Early cement—the cement that gains strength several times faster than normal portland cement. Here's the result:

Concreting of the substructure was started on January 1. The superstructure was completed on March 5. The architect and contractor estimate that the use of Atlas High-Early concrete enabled them to save 25 days' time and, consequently, greatly reduced protection and curing costs. Also, forms were stripped in 36 hours, thus saving one set of forms . . . or $300.

Aside from speeding up rush construction, Atlas High-Early cement often pays back its slightly higher cost over and over again by saving days and even weeks of costly building time. Give Atlas High-Early a trial on your next job! Universal Atlas Cement Co. (United States Steel Corporation Subsidiary), Chrysler Building, N. Y. C.

CM-H-12

ATLAS HIGH-EARLY CEMENT

A UNIVERSAL ATLAS PRODUCT

Construction Methods

ROBERT K. TOMLIN, Editor

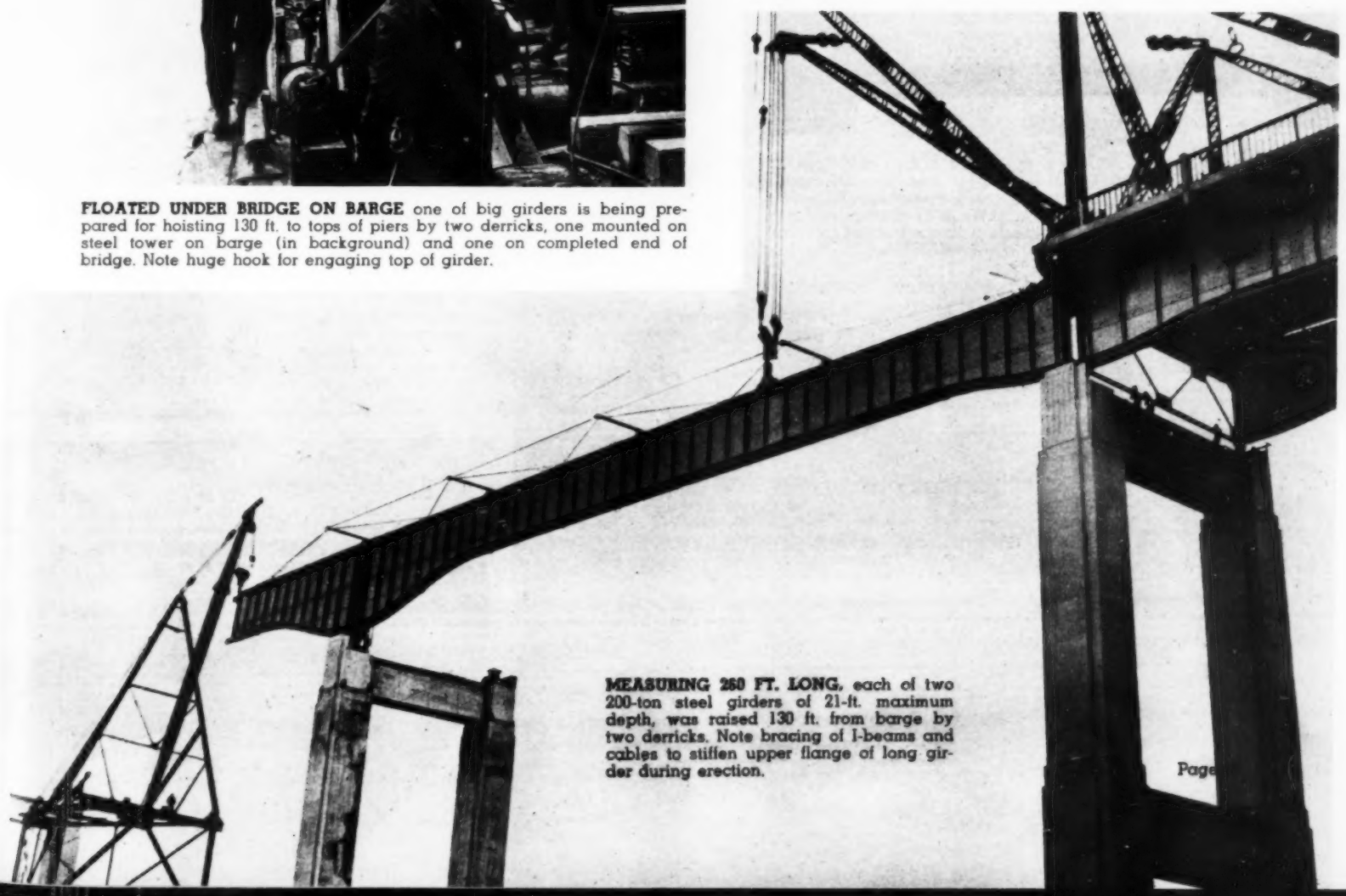
Volume 22 | MAY, 1940 | Number 5

FLOATED UNDER BRIDGE ON BARGE one of big girders is being prepared for hoisting 130 ft. to tops of piers by two derricks, one mounted on steel tower on barge (in background) and one on completed end of bridge. Note huge hook for engaging top of girder.

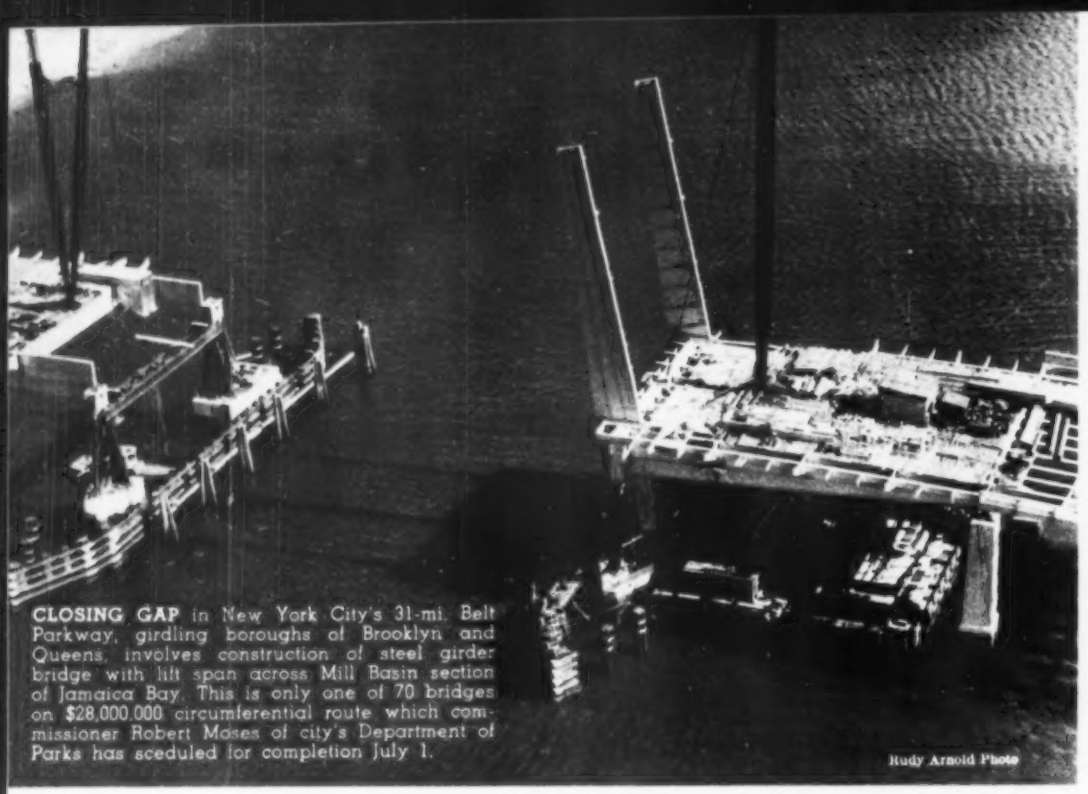
200-Ton Girders RAISED ON EDISON BRIDGE

CLAIMED TO BE THE LARGEST fabricated steel members ever hoisted by derricks on a construction job, two girders each measuring 260 ft. long, 21 ft. deep and weighing 200 tons, were raised 130 ft. vertically on March 14 from a barge to the tops of concrete piers of the $4,670,000 Thomas A. Edison memorial bridge spanning the Raritan River near Perth Amboy, N. J. Designed by Morris A. Goodkind, engineer of bridges for the New Jersey State Highway Department, of which James Logan is chief engineer, the bridge is a deck

(Continued on page 104)



MEASURING 260 FT. LONG, each of two 200-ton steel girders of 21-ft. maximum depth, was raised 130 ft. from barge by two derricks. Note bracing of I-beams and cables to stiffen upper flange of long girder during erection.



CLOSING GAP in New York City's 31-mi. Belt Parkway, girdling boroughs of Brooklyn and Queens, involves construction of steel girder bridge with lift span across Mill Basin section of Jamaica Bay. This is only one of 70 bridges on $28,000,000 circumferential route which commissioner Robert Moses of city's Department of Parks has sceduled for completion July 1.

Rudy Arnold Photo

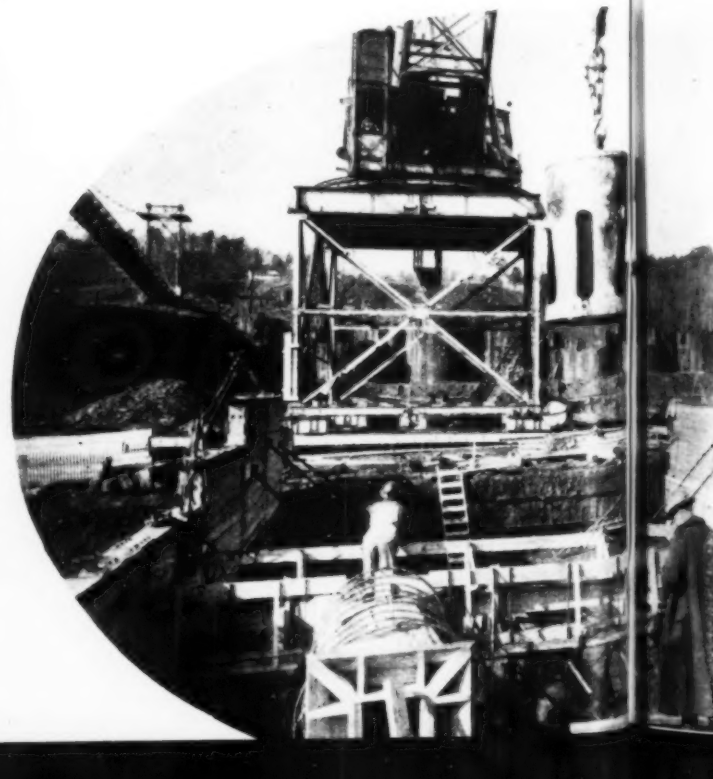
FOURTEEN ELECTRODES deposit weld metal in girth seams and butt joints of steel lining installed in 2,150 ft. at Manhattan end of each of twin tubes of Queens Midtown Tunnel New York City, where J. K. Welding Co., Long Island City, does field welding for Woodcrest-Rosoff Corp., contractor on Manhattan section of tubes and for Walsh Construction Co., contractor for under-river crossing. Steel lining is sealed by continuous saddle welds around girth seams and by welding butt joints between segments of rings 5 ft. wide, prefabricated and shop-welded by Bethlehem. Fourteen electric-motor-driven welding sets ride on rolling platform supplied by tunnel contractor.

THIS MONTH'S NEWS REEL

SEPULVEDA DAM. Army Engineer flood control project in California's San Fernando valley, is scene of ground-breaking ceremonies, Feb. 15, as LIEUT.-COL. E. C. KELTON, district engineer directs initial spade work by County Supervisor ROGER W. JESSUP and three pretty movie actresses, HELEN PARRISH, JANE WYMAN and PEGGY MORAN. Dam will be rolled earth-fill structure, on Los Angeles River, with crest length of 15,500 ft. and maximum height of 50 ft. Low bid of $3,121,268 was submitted by Jahn-Bressi-Bevanda Constructors, Inc., David C. Gordon and Joseph A. Dowling, of Los Angeles.

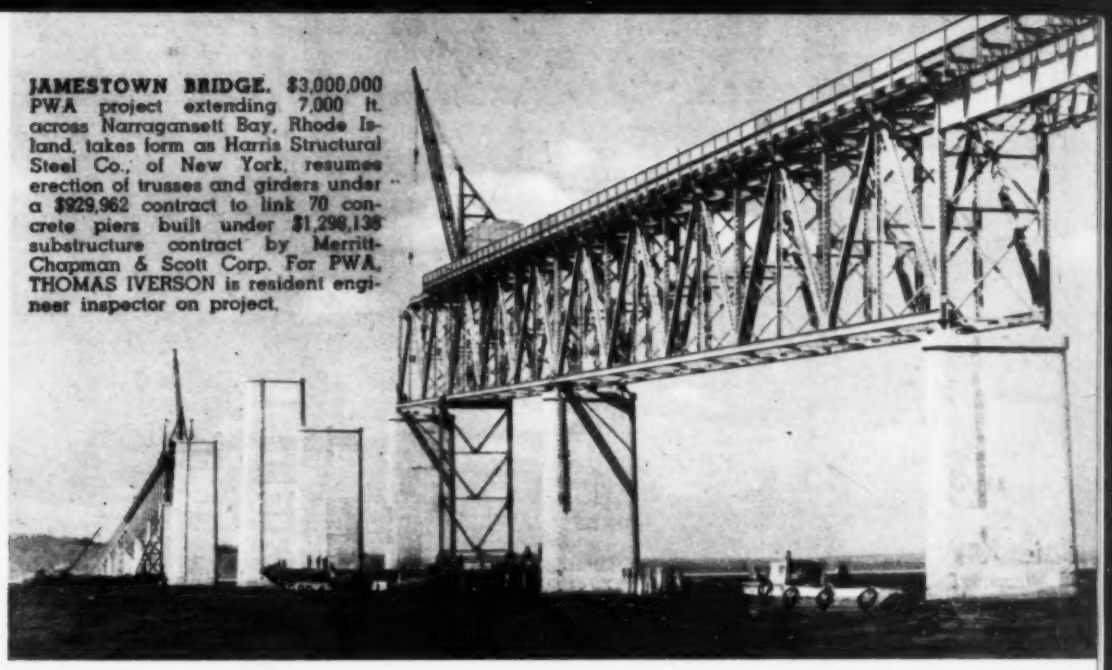
SOUTH JAMAICA HOUSES (below), New York City Housing Authority project for negro occupancy in Jamaica, Long Island, is scene of cornerstone laying ceremonies April 15. First unit of project involves eleven brick buildings of three and four stories constructed at cost of approximately $1,400,000 by H. R. H. Construction Co., of New York City

Wide World Photo



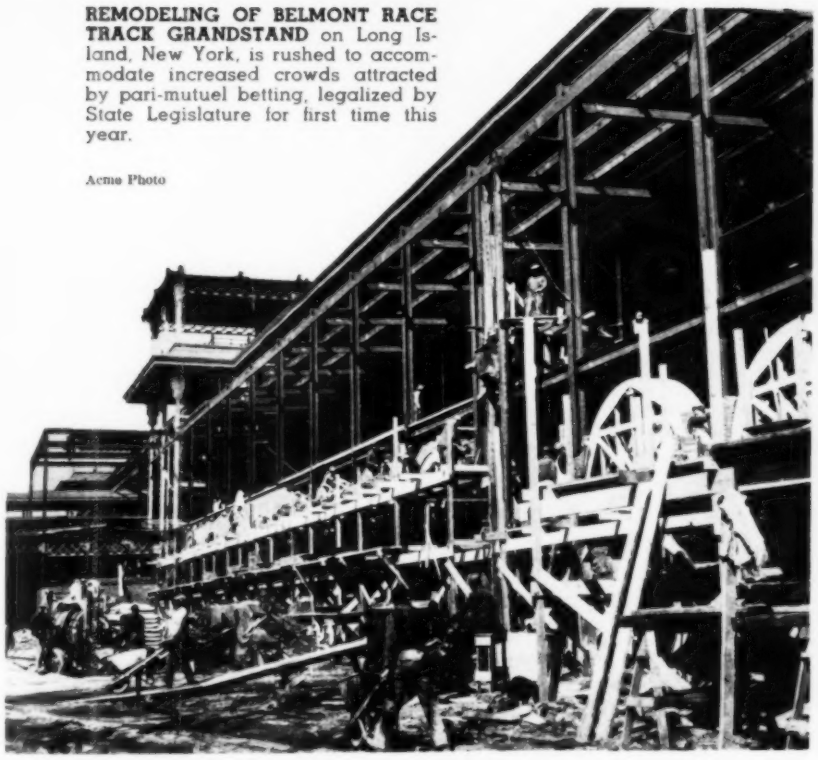
Hobart Bros. Photo

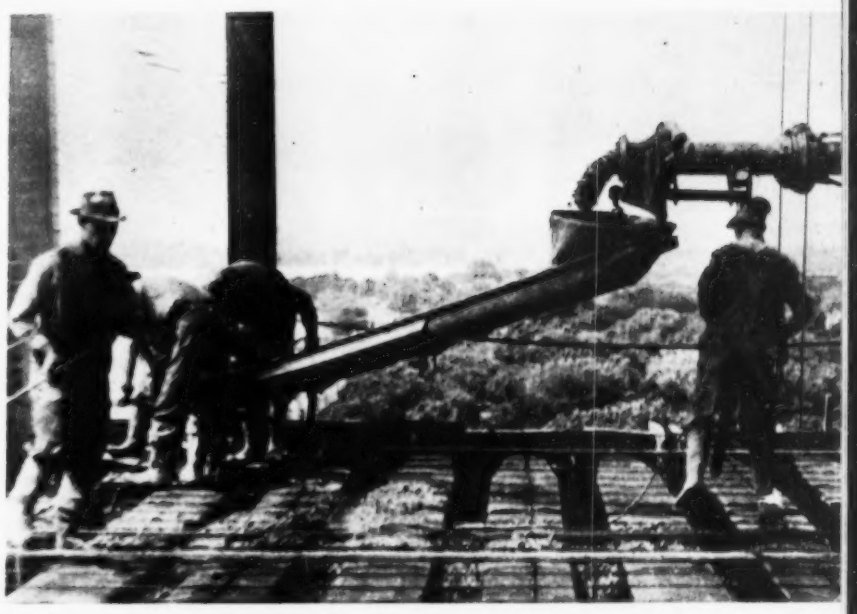
JAMESTOWN BRIDGE. $3,000,000 PWA project extending 7,000 ft. across Narragansett Bay, Rhode Island, takes form as Harris Structural Steel Co., of New York, resumes erection of trusses and girders under a $929,962 contract to link 70 concrete piers built under $1,298,138 substructure contract by Merritt-Chapman & Scott Corp. For PWA, THOMAS IVERSON is resident engineer inspector on project.



REMODELING OF BELMONT RACE TRACK GRANDSTAND on Long Island, New York, is rushed to accommodate increased crowds attracted by pari-mutuel betting, legalized by State Legislature for first time this year.

Acme Photo

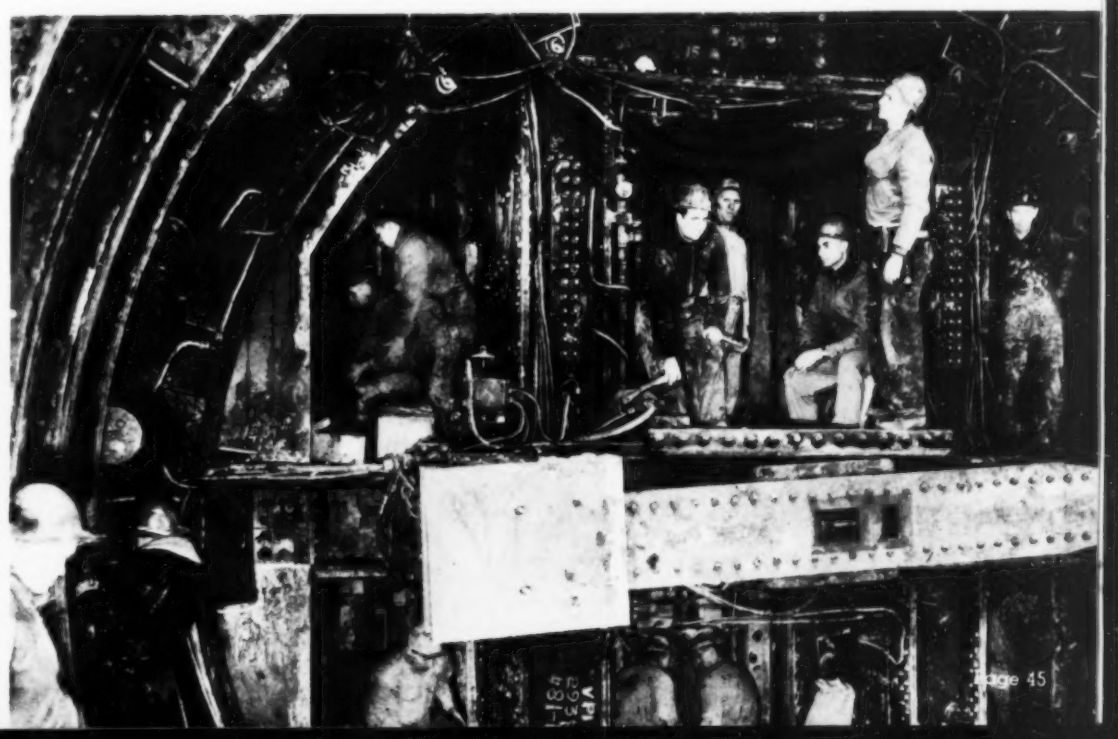




HIGHEST LIFT FOR PUMPED CONCRETE is reported from State Office Building at Madison, Wis., where contractor delivered mix for upper-story floor of structure to vertical height of 185 ft., using 6-in. pipe fed by Pumpcete unit.

TUNNELING FOR CHICAGO'S NEW SUBWAY (below) is making rapid progress in compressed air with aid of 225-ton, 25-ft. 3½-in.-diameter shield under State St., operated by sandhog crew of Healy Subway Construction Co., who have advanced shield as much as 47 ft. in 24 hr. through typical Chicago blue clay. Project is under direction of Ralph H. Burke, chief engineer of the city's Department of Subways and Superhighways.

FIRST CONCRETE AT WATTS BAR DAM is placed Feb. 28 by bottom-dump bucket in navigation lock of Tennessee Valley Authority project 59 mi. upstream from Chickamauga dam in Tennessee. In background are walls of cellular sheetpile cofferdam for main body of dam which, when completed, will be 97 ft. high and 2,970 ft. long, forming 41,500 acre-ft. reservoir reaching 72 mi. up Tennessee River.



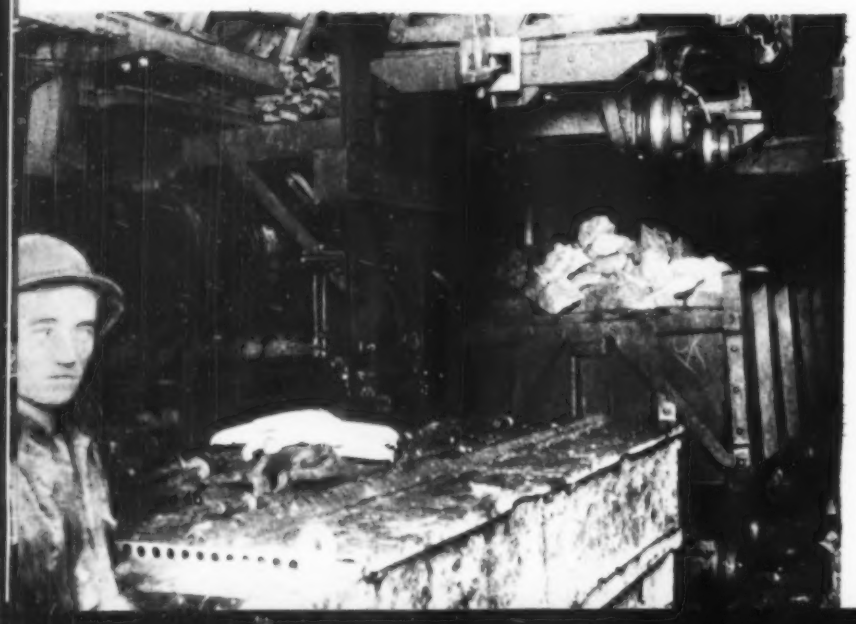
TWO TYPES OF ROOF SUPPORT meet at this point in bypass tunnel being driven by Associated Contractors, Inc., under Kensico Reservoir. Nearer type utilizes 6-in. 25-lb. ribs set 3 in. outside A-line of 14-in. concrete lining and supported on 8-in. wall plates. Roof support in background consists of 6-in. 20-lb. ribs set 8 in. outside neat concrete line on 6-in. wall plates. At left is 25-in.-diameter ventilation pipe, with compressed air and water lines below it. Pump discharge pipe and electric lighting lines are suspended from wall plate at right. Finished diameter of tunnel is 15 ft.

TWELVE CONTRACTORS DRIVE *85-Mile Rock Tunnel* FOR DELAWARE AQUEDUCT

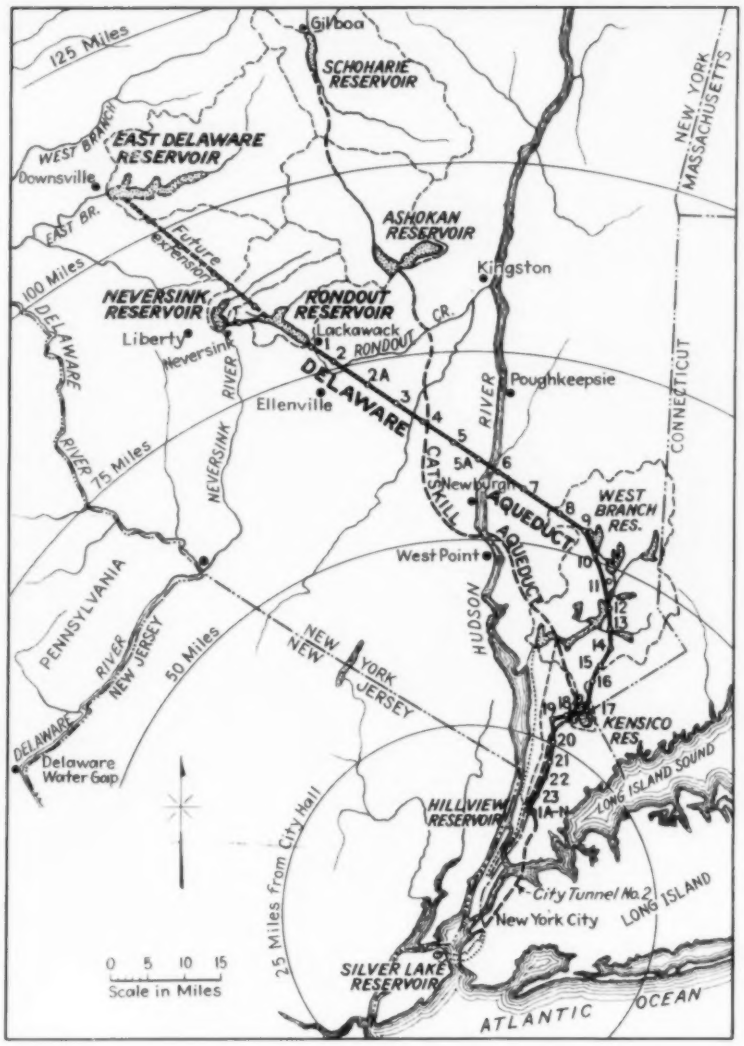
FROM 26 OF 30 COMPLETED SHAFTS 314 to 1,550 ft. deep, eleven contractors are at work driving or lining tunnel for the 85-mi. Delaware aqueduct of the New York Board of Water Supply. An additional shaft, from which a short length of tunnel will be driven, is being sunk by a twelfth contractor at the intake in the Catskill Mountains, 85 mi. from the discharge end of the aqueduct at Hill View reservoir in Yonkers. The entire aqueduct will carry water under pressure, and the tunnel is located at sufficient depth below the surface to permit concrete lining to finished diameters of 13½ ft. to 19½ ft. without use of reinforcement.

Tunnel contracts ranging from 27,000 to 75,000 ft. in length and from $10,000,000 to $21,000,000 in value have set a high premium on careful preplanning and selection of dependable, economical equipment and methods by the contractors. As a result, the jobs exemplify the highest development of the rock tunneling art. Representative tunnel-driving methods on three contracts are illustrated by accompanying photographs.

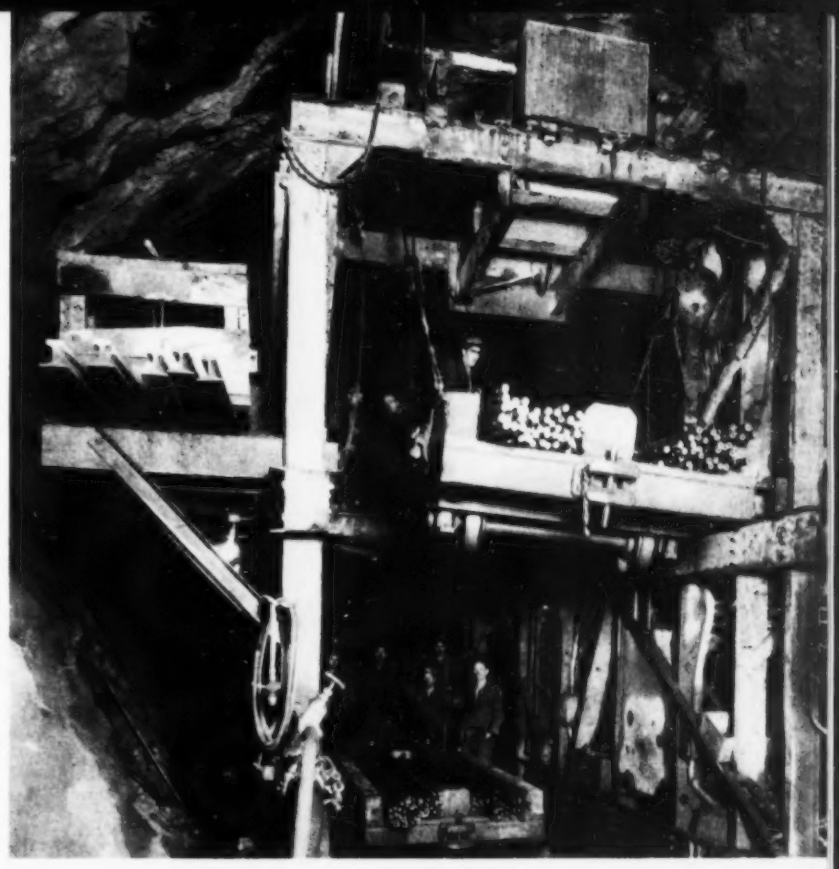
Delaware Aqueduct — New sources of water supply on two tributaries of the Delaware River and on Rondout Creek, a tributary of the Hudson, are to be tapped by the Delaware



ELECTRIC STORAGE-BATTERY LOCOMOTIVE (left) pulls loaded muck cars back through drill carriage while empty muck car hangs suspended above track by means of small electric hoist mounted on rear end of drill carriage. This cherry-picker hoist holds empty car aloft until locomotive pulls loaded cars clear, when empty is lowered to track and is pushed up to heading to be loaded. Associated Contractors, Inc., haul muck with five- or six-car trains, each car holding about 6 cu.yd.

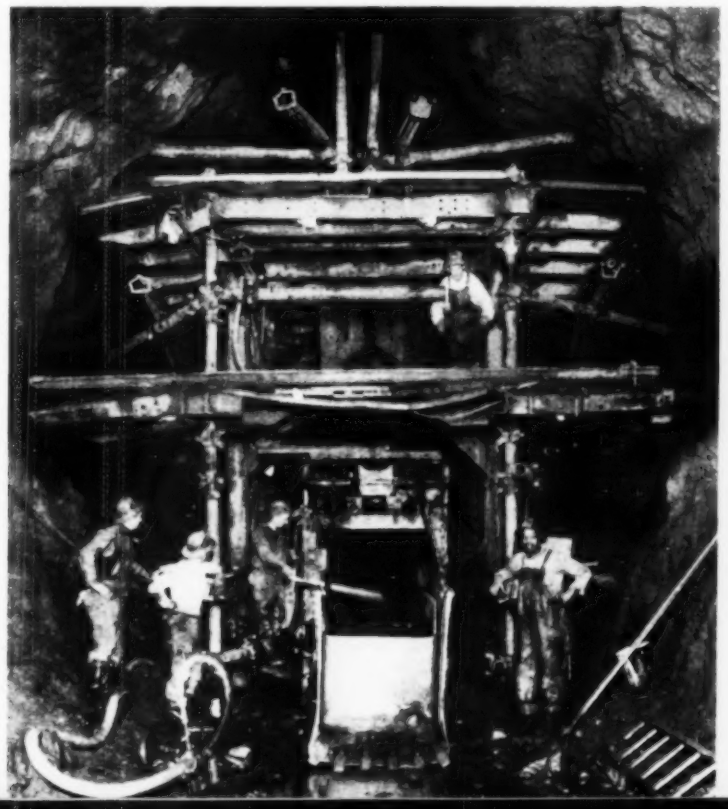


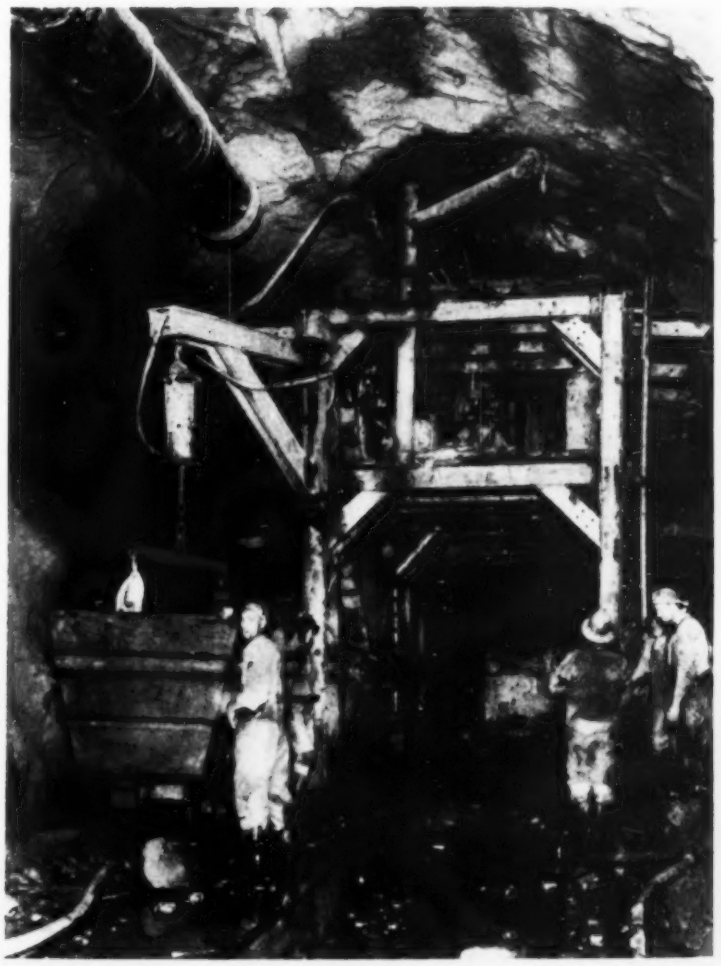
PRESENT CONSTRUCTION on Delaware aqueduct comprises 85 mi. of deep rock tunnel connecting Rondout reservoir in rugged Catskills with Hill View reservoir at northern boundary of New York City. All preliminary estimates of tunneling progress are being outstripped by contractors, and tunnel is expected to be in operation by 1944. At five of 26 numbered shaft locations, shafts are double, as indicated by accompanying profile.



CHERRY-PICKER HOIST on rear end of drill carriage in 19-ft. finished tunnel being excavated to about 24-ft. diameter by Associated Contractors, Inc., raises flat car carrying drill steel to level of deck on drill carriage to facilitate sliding of drill steel directly from car to drills. In general, nine drills are used to drill full face heading in this tunnel, four being mounted on adjustable arms below deck, three at deck level and two above.

DRILL JUMBO (below) traveling on rails mounts battery of drifter drills on adjustable horizontal arms ready to be moved up to start drilling of full face for 19½-ft. finished tunnel on S. A. Healy contract. Conway mucking machine on narrow-gage track moves through center of drill carriage.

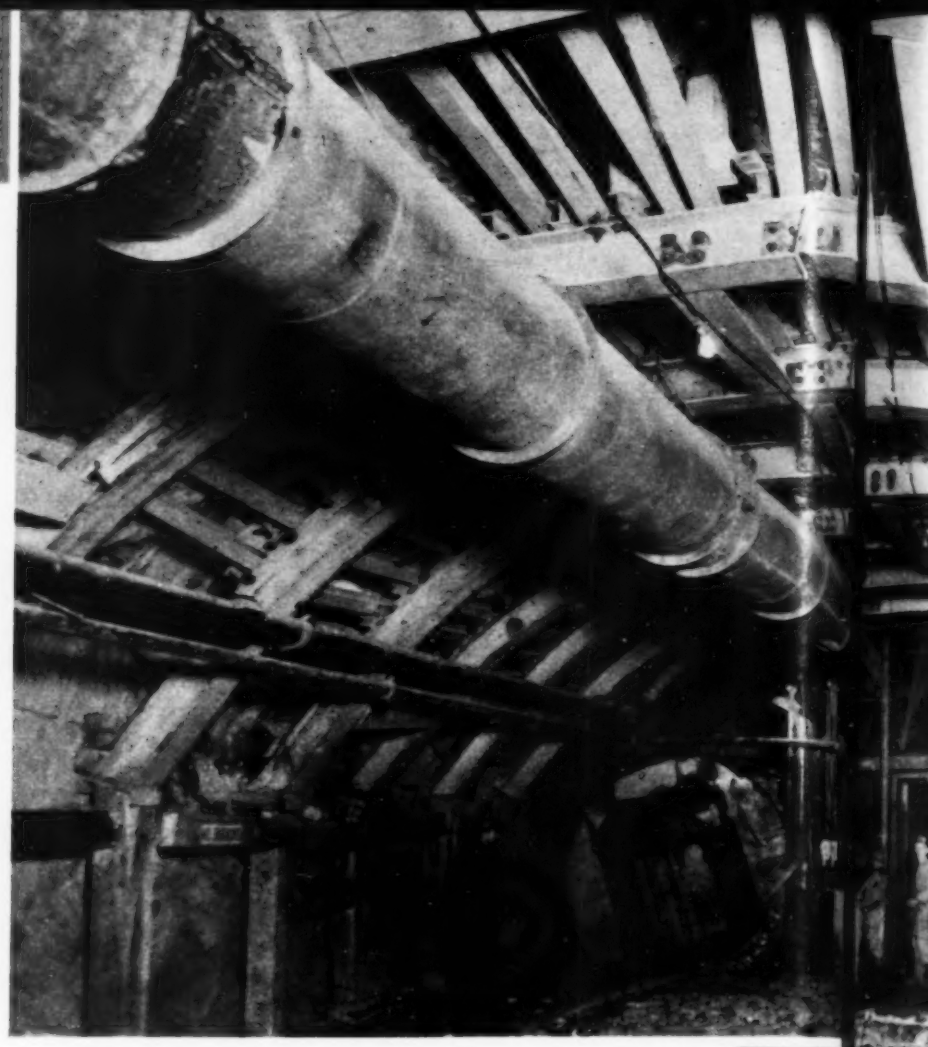




AIR JACK on swinging boom serves as cherry-picker to lift empty muck car clear of track while electric storage-battery locomotive returns loaded cars through drill carriage on contract section of S. A. Healy Co., excavating roughly to 24-ft. diameter for 19½-ft. tunnel.

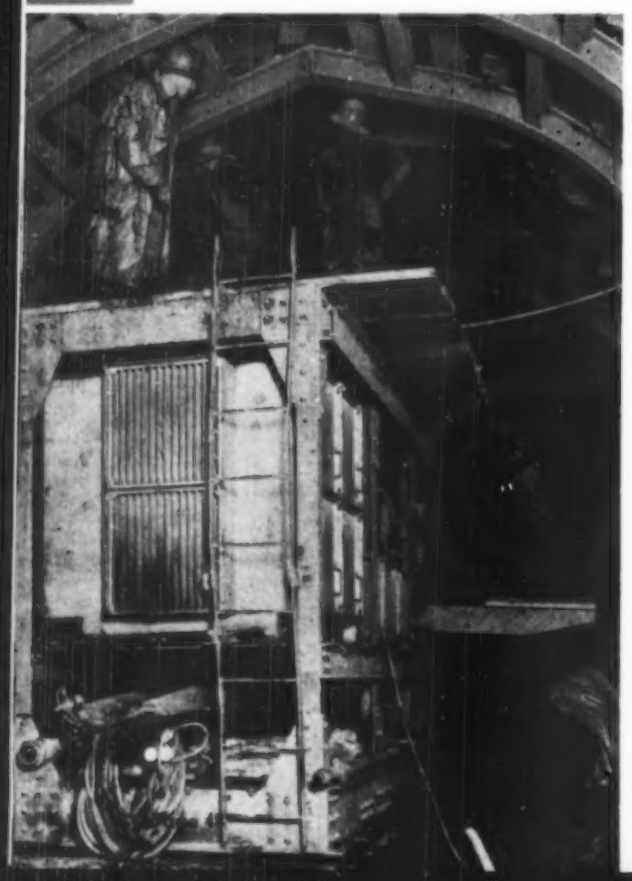
Delaware Aqueduct (continued)

ROTARY CAR DUMPER first adopted by S. A. Healy on Jefferson Ave. shield-driven sewer tunnel in Detroit is again applied by this contractor to discharging of muck into skips at foot of shaft on Delaware aqueduct construction. Car is run into rotary dumper which turns clockwise to discharge muck.

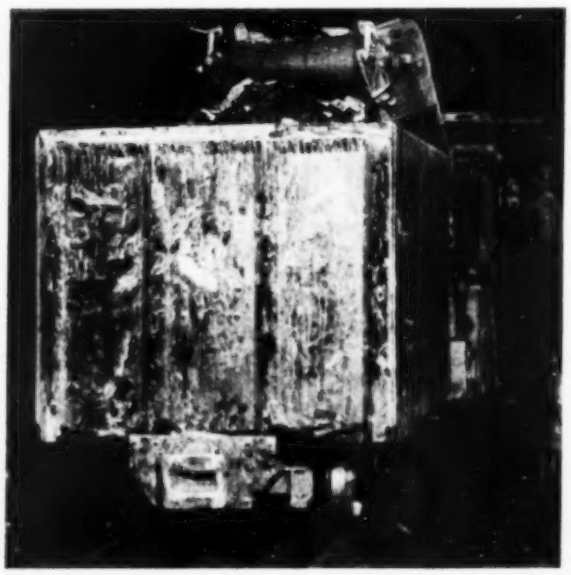


AT FOOT OF SHAFT 3 on contract of Samuel R. Rosoff, Ltd., roof support consists of 19-in. 54-lb. ribs spaced 6 ft. on centers. Maximum span between inside of posts at bottom of shaft is 35 ft. Suspended below steel ribs is 28-in.-diameter steel blower pipe, assembled in 16-ft. lengths. To left of cage structure at bottom of shaft can be seen car dumping apparatus, with muck car in overturned position in car dumper. Two car dumpers, one for each skip, are operated by compressed air pistons. Car dumper holds car securely in place while it is rotated.

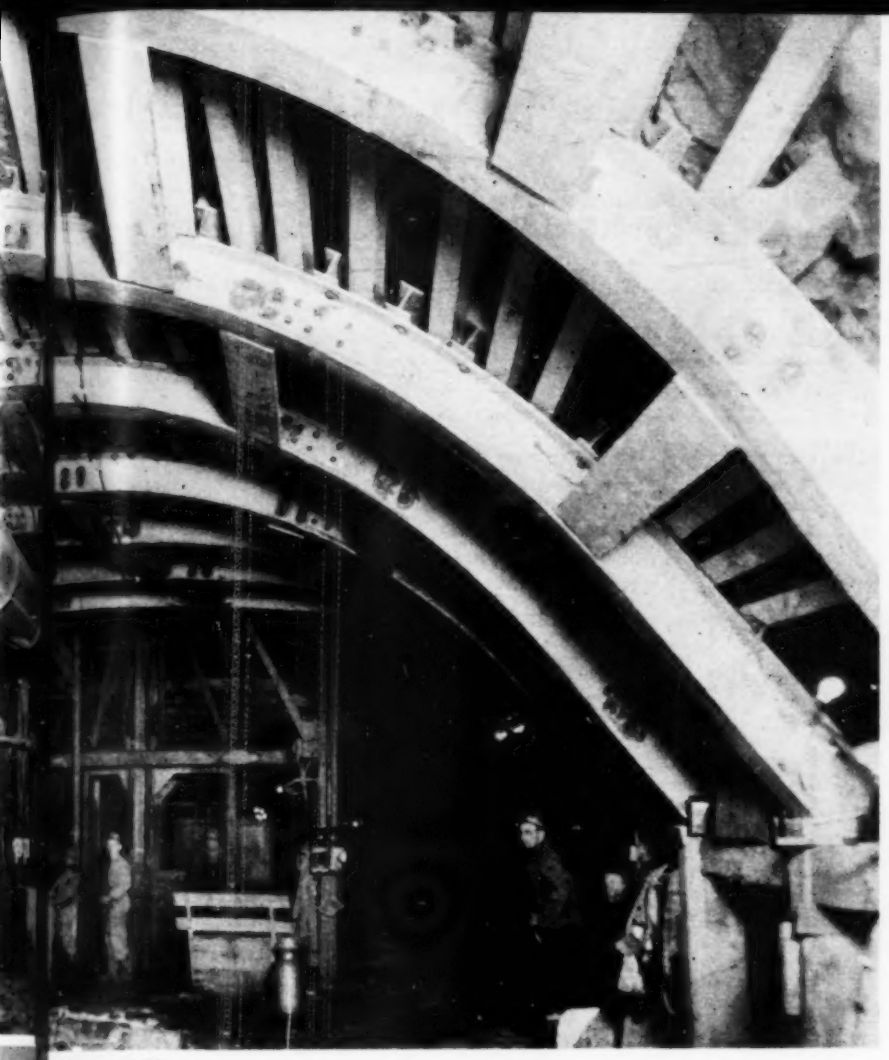
RECIRCULATED AIR issues from filters of Roto-Clone unit **(below)** at back and sides of drill carriage. Fan pulls air from heading through louvers at top and bottom of front end of carriage and exhausts it, after dust precipitation by water spray, through filters. On Rosoff contract, exhaust air during drilling operation is bypassed through ports in right side connected by flexible tube back to main ventilation system of tunnel. Capacity of auxiliary blower unit is about 7,000 cu.ft. of air per minute.



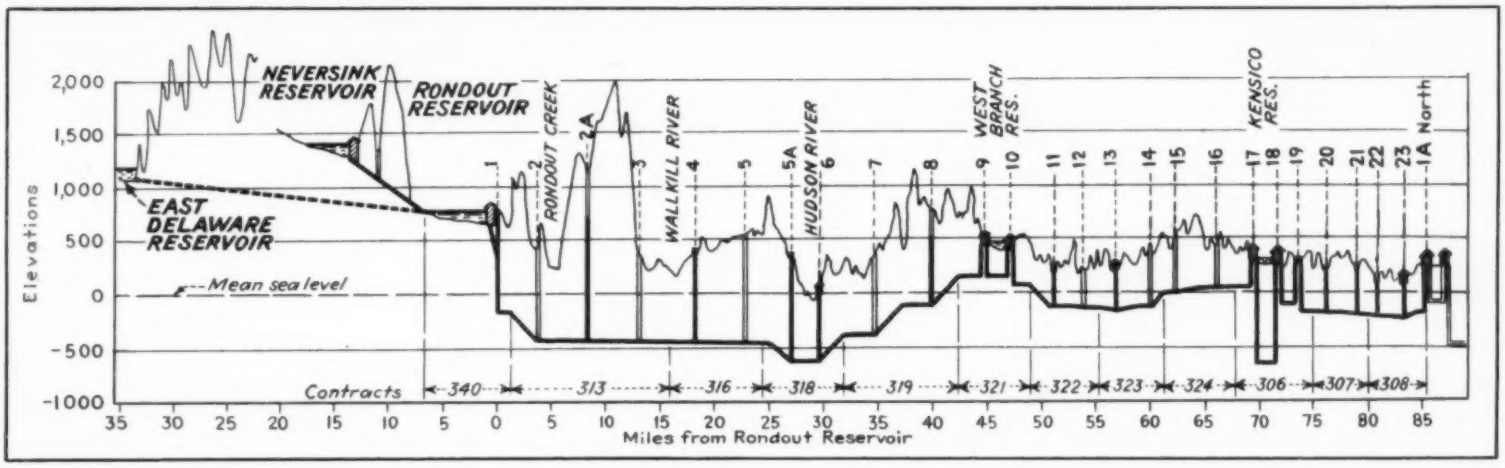
REAR-END LOADER CONVEYOR (right) on mucking machine delivers excavated rock to 6-cu.yd. steel muck car. When loading is completed, car is run back to cherry picker, which replaces it with empty car at head of train.



DIGGING END of Conway electrically operated mucking machine **(below)** in Rosoff tunnel picks up muck in dipper as machine forces digging bucket into muck pile. Dipper and chute then are raised by hoist chains, allowing muck to slide back to conveyor loader on machine.



BATTERY CHARGING STATION in Rosoff tunnel is equipped with overhead trolley crane which raises batteries from chassis of locomotive and moves them to rear end of platform, where charging apparatus is located. To accommodate width required for charging station in this tunnel, which will have finished diameter of 13½ ft., steel roof support consisting of 6-in. 27½-lb. ribs spaced 4 ft. on centers was spread by means of steel wedges placed at crown between rib segments. At upper right is 28-in.-diameter steel blower pipe.



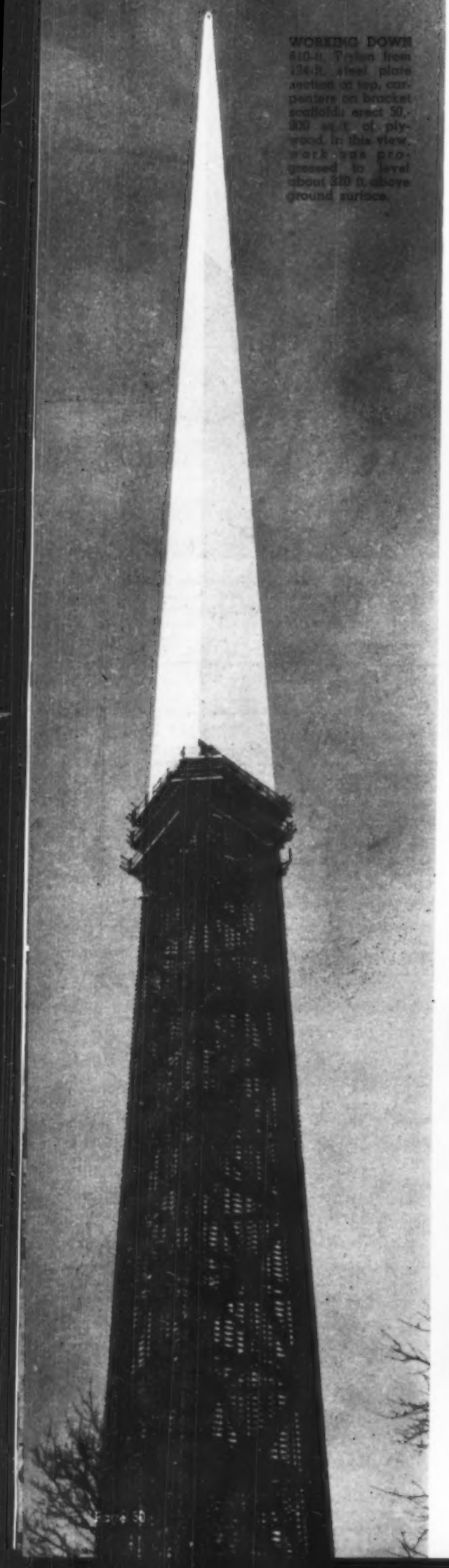
PRESSURE AQUEDUCT 85 mi. long is made up of six successive tunnels interconnected through gate houses over double shafts at five locations. Of 31 shafts available for tunnel construction, 23 will remain open for purposes of access, operation and control after aqueduct goes into operation; those marked in solid black to top will carry water to or from surface. Tunnel contract numbers correspond with those in tabulation below.

DELAWARE AQUEDUCT—Shaft and Tunnel Contracts Awarded to March 20, 1940

CONT. NO.	CONTRACTOR	MAIN FEATURES OF WORK	BID PRICE	ESTIMATED PROGRESS ** FOR MONTH TO MARCH 20, 1940	ESTIMATED PROGRESS ** TOTAL TO DATE TO MARCH 20, 1940	PER CENT COMPLETED (APPROX.)
306	Associated Contractors, Inc.	18,850 ft. 15-ft. tunnel, 16,030 ft. 19½ ft. tunnel, influent, coagulating, effluent and aeration works	$21,333,333.33	$584,034.80	$8,723,922.95	40.9
307	S. A. Healy Company	26,820 ft. 19½-ft. tunnel	10,097,135.00	224,103.10	6,765,016.83	67.0
308	J. F. Shea Co. Inc. & Henry J. Kaiser Co.	29,140 ft. 19½-ft. tunnel	11,971,885.00	303,206.38	7,140,387.42	59.6
313	Samuel R. Rosoff, Ltd.	75,100 ft. 13½-ft. tunnel	18,916,650.00	823,681.50	3,198,006.00	16.9
316	Walsh Construction Company	48,100 ft. 13½-ft. tunnel	11,111,111.11	490,328.00	3,180,602.00	28.6
318	Pleasantville Constructors, Inc.	36,600 ft. 13½-ft. tunnel	10,679,710.00	476,652.61	2,542,333.97	23.8
319	Dravo Corporation	55,900 ft. 13½-ft. tunnel	11,431,975.00	270,402.60	1,665,534.40	14.6
321	Frazier-Davis Construction Co.	11,900 ft. 13½-ft. tunnel, 23,100 ft. 15 ft. tunnel, influent and effluent chambers	11,924,450.00	358,652.00	2,917,788.00	24.5
322	The Utah Construction Company	33,400 ft. 15-ft. tunnel & Shafts 11 and 12	10,829,530.00	329,215.15	5,344,817.15	49.4
323	Seaboard Construction Corporation	30,600 ft. 15-ft. tunnel & Shafts 13 and 14	10,810,166.50	429,798.05	4,668,438.00	43.2
324	S. A. Healy Company	37,100 ft. 15-ft. tunnel & Shafts 15 and 16	10,985,200.00	382,124.65	3,531,184.13	32.1
332	Dravo Corporation	Shafts 2, 2A and 3	1,738,250.00	.....	1,443,503.87	100.0
333	Frazier-Davis Construction Co.	Shafts 4, 5, 5A and 6	2,294,415.00	.....	2,042,334.52	100.0
334	W. E. Callahan Const. Co. & J. P. Shirley	Shafts 7, 8, 9* and 10*	1,926,150.00	.....	1,784,732.36	100.0
336	Dravo Corporation	Shafts 17*, 18*, 19*, 20, 21, 22 and 23	4,108,583.00	.....	3,947,542.32	100.0
338	Triest Construction Company, Inc.	Exploratory caissons, Merriman Dam	737,777.00	.....	543,059.37	100.0
339	B. Perini & Sons, Inc.	Diversion tunnel and cofferdam, Merriman Dam	2,869,390.00	25,737.11	2,738,862.73	96.1
340	Mason & Hanger Company, Inc.	Merriman Dam, appurtenances, effluent works, Shaft 1, 2,500 ft. 15-ft. and 5,900 ft. 13½-ft. tunnel	15,486,150.00	166,089.00	508,781.00	3.3

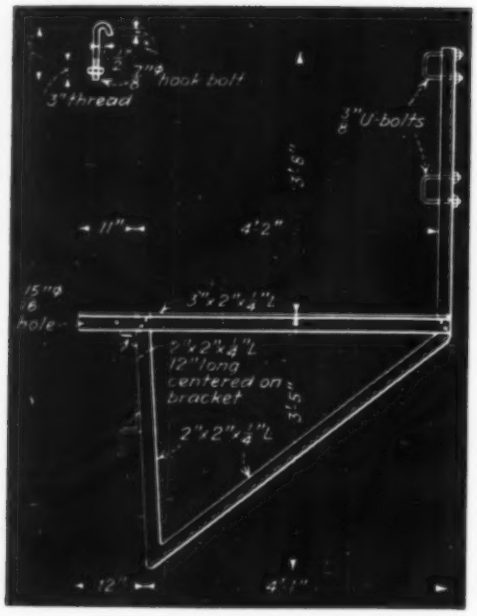
*Uptake and downtake shafts.

** To spread clerical load in headquarters office, estimate dates are staggered for various contracts. Estimate months noted ended at different dates from Feb. 25 to March 20.

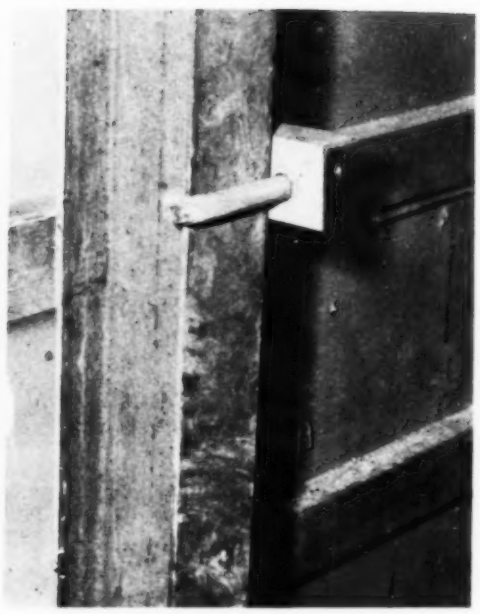


WORKING DOWN 410-ft. Trylon from 434-ft. steel plate section at top, carpenters on bracket scaffolds erect 50,000 sq. ft. of plywood. In this view, work was progressed to level about 320 ft. above ground surface.

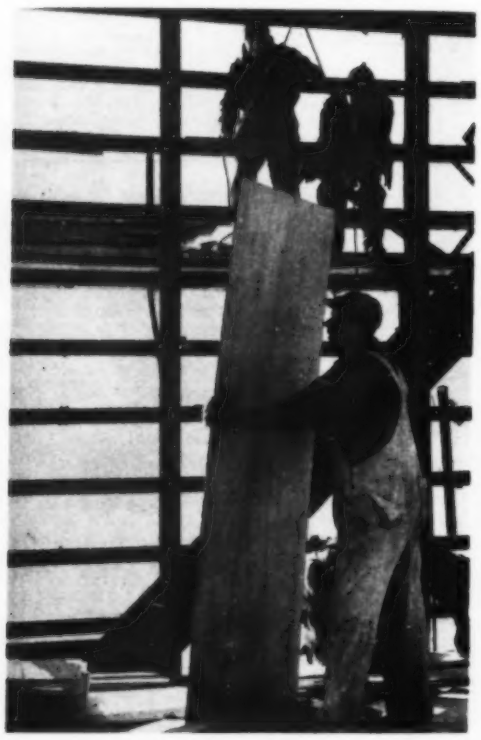
WORLD'S FAIR TRYLON GETS *Plywood Overcoat*



STEEL BRACKET as originally designed by Fair's construction department to support outside scaffold, is tested under load in excess of 4,000 lb. Bent angle hook on lower leg of bracket is for temporary support on wooden nailer during erection until hook bolt is drawn tight.



HOOK BOLT anchors bracket to back flange of I-section steel purlin.



FROM TEMPORARY PLANK PLATFORMS inside Trylon, workmen pass plywood sheets to carpenters on scaffold. Ironworkers on scaffold in background are lowering steel scaffold brackets for erection at new level.

PRIOR TO ERECTION, edges of plywood panels are buttered with calking compound to seal butt joints between siding units.

TO ELIMINATE DIFFICULTIES resulting from condensation inside the 610-ft. Trylon, the New York World's Fair covered 410 ft. of the tall steel-frame tetrahedron with 50,000 sq.ft. of exterior grade Douglas fir plywood erected under contract by the J. A. J. Construction Co., Brooklyn, with the aid of outside scaffolds supported on steel brackets designed by the Fair's construction department. The plywood siding extends from a 124-ft. top section covered with riveted steel plate to a 75-ft. base section of fire-resistant construction through which visitors pass to a bridge connecting the Trylon with the adjacent Perisphere. Five-ply waterproof exterior grade plywood ½ in. thick, manufactured in hot plate presses which assist penetration of the phenolic resin binder into the fibers of the wood laminations, was supplied in 8- and 9-ft. lengths and in a special width of 32 in. to fit the 16-in. nailer spacing on the Trylon.

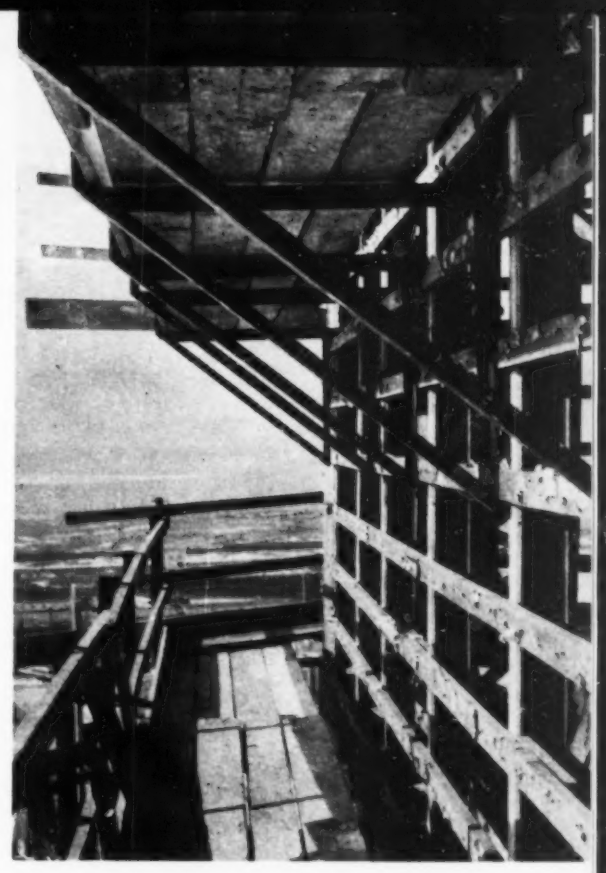
As an extra precaution for this job, the plywood panels were given a sealer application by dipping in a primer which fills the pores and prevents any surface checking. In the process of erection on the Trylon, joints between the panels were sealed with calking compound, and the outer surface of the plywood was given the first of two coats of rubber-base paint. The second coat was applied a little later in the course of painting the entire Trylon.

Erected in 1938, the Trylon is a three-sided pylon tapering to a point 610 ft. above the ground from a triangular base measuring 63 ft. on a side. From the steel-plate top section to the ground, the Trylon originally was covered with magnesite stucco on gypsum board backing. Soon after completion of the cover, severe condensation was noted on the sheathing inside the structure, and three louvers were installed at the top to induce air circulation; two of these louvers are still in use. Even with the improved air circulation, condensation continued to form on the sheathing. Additional moisture seeped in through construction joints at about 200- and 400-ft. levels, where temporary openings had been left during application of the cover material for beams to support tubular scaffolding on the outside of the tower. As a result of the moisture conditions, the gypsum board sheathing lost its nail holding power. In the fall of 1939, at the end of the Fair's first year, high winds opened holes in the cover, and the construction department determined to replace the old siding with exterior grade plywood, which was judged to be the most economical and adaptable material capable of resisting the internal moisture conditions.

Gypsum board sheathing and magnesite stucco are still giving good service on the Perisphere, where internal moisture conditions are not serious. Under the present contract of the J.A.J. Construction Co., the 75-ft. base section of the Trylon is to be inclosed with stucco on self-furring expanded metal lath. Because it is used for access to the Perisphere, this section of the Trylon is classed as occupied area, and the walls must be of fire-resistant construction to meet the requirements of the Fair's building code.

In preparation for erecting the plywood, the contractor stripped all the gypsum board and stucco cover material from the Trylon. Starting at the top

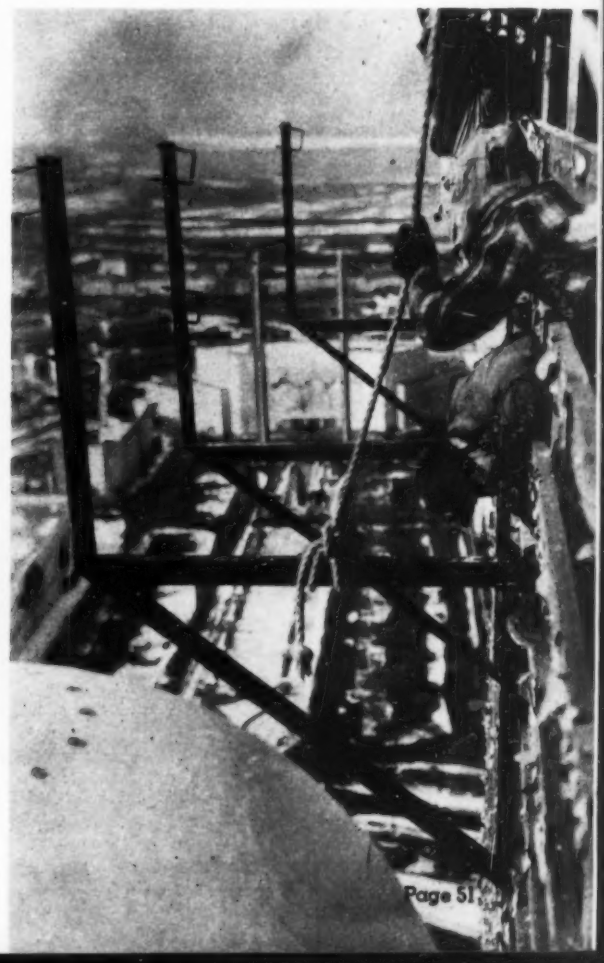
(Continued on page 98)



BRACKET SCAFFOLDS fastened by hook bolts to purlins and supported by bearer angles on wood nailers provide exterior working platforms for erection of plywood siding. Nails and fragments of old sheathing remain to be cleaned from nailers.

EXTERIOR GRADE PLYWOOD (left), manufactured in special 32-in. width to fit 16-in. nailer spacing, is erected with vertical joints in successive courses staggered. To back up vertical joints, 2x4-in. cats are installed between horizontal nailers. Wood grounds and nailers of original secondary wall framing are fastened to steel purlins with self-tapping screws. **BEFORE APPLYING FIRST COAT** of rubber-base paint **(right),** painter seals joints and removes excess calking compound.

LOWERED ON ROPE (below), scaffold bracket is fastened by hook bolt to purlin at new level. Part of Perisphere looms just below bracket.



Britain Trains Royal Engineers

FOR WAR SERVICE

1

2

3

4

5

BRITAIN TRAINS ROYAL ENGINEERS FOR WAR SERVICE. Army's sappers receive instruction in (1) erecting bridge truss; (2) and (4) placing pontoons for river crossing; (3) and (5) raising telegraph poles.

JOB oddities

EASY ON THE EYES are American Optical Co.'s new safety goggles, illustrated by this gigantic model large enough to fit a giant 50 ft. tall. Arching of lenses, based on same principles which give strength to stone or concrete arch, coupled with special hardening process, enable glass to resist impact of flying objects. Side shields provide further protection for eyes.

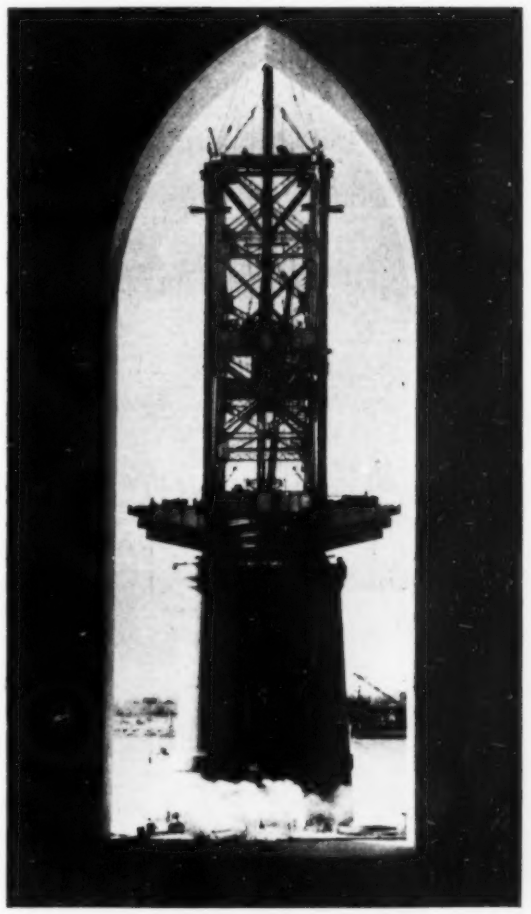
EMERGENCY QUILTED PLUG is prepared by Consolidated Builders, Inc., to form watertight stop in upper end of penstock opening at U. S. Bureau of Reclamation's Grand Coulee dam in Washington. Plug was built in anticipation of flash floods in Columbia River, but water did not reach height requiring use of huge stopper.

800-MILE TREK under their own power across four states, from assembly plant at Newton, Ia., to site of Caddoa dam near Lamar, Colo., is made by fleet of ten new Koehring wheeler-scrapers, purchased by Western Contract Corp., of Sioux City, Ia., for moving 3,500,000 cu.yd. of material involved in relocation of 22 mi. of track of Santa Fe R.R. around damsite. Each of wheeler-scraper units weighs 24,700 lb.

Wide World Photo

AMERICAN GOTHIC (construction version) **(right)** frames first of four river piers in opening through east pier of $10,000,000 Mississippi River bridge at Baton Rouge, La. Bethlehem Steel Co. will complete superstructure of combination rail and highway bridge this summer.

GIVEN A FACIAL by painter swung aloft on rope rigging, stately Pacifica, towering 80-ft. theme statue of San Francisco World's Fair, gets ready for Fair's 1940 opening on May 25.

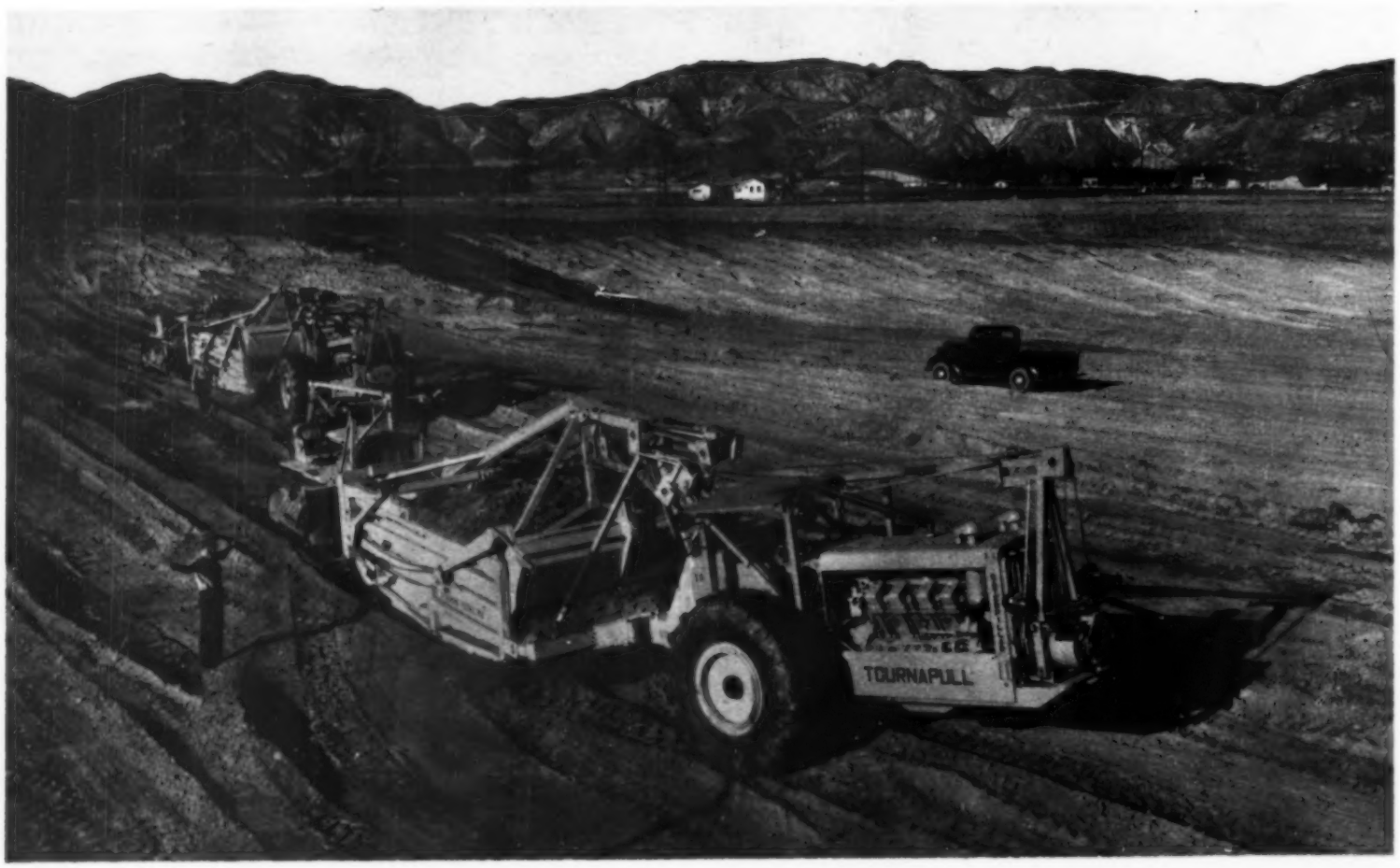


Speed

Marks Earth-Moving With New Equipment At Hansen Dam

WORLD'S LARGEST DRY-EARTH FILL, amounting to 14,700,000 cu.yd., is being placed in Hansen dam by tractor-scraper outfits and by trucks loaded in borrow pit by power shovels. Completed dam will be 100 ft. high and 9,500 ft. long.

LOADING OF SCRAPERS IN BORROW PIT (below) is speeded by employing pusher tractor, in rear, to aid two-wheeled 160-hp. diesel-powered Tournapull. Later an additional tractor was hooked on to pull in front of Tournapull during loading operation only.

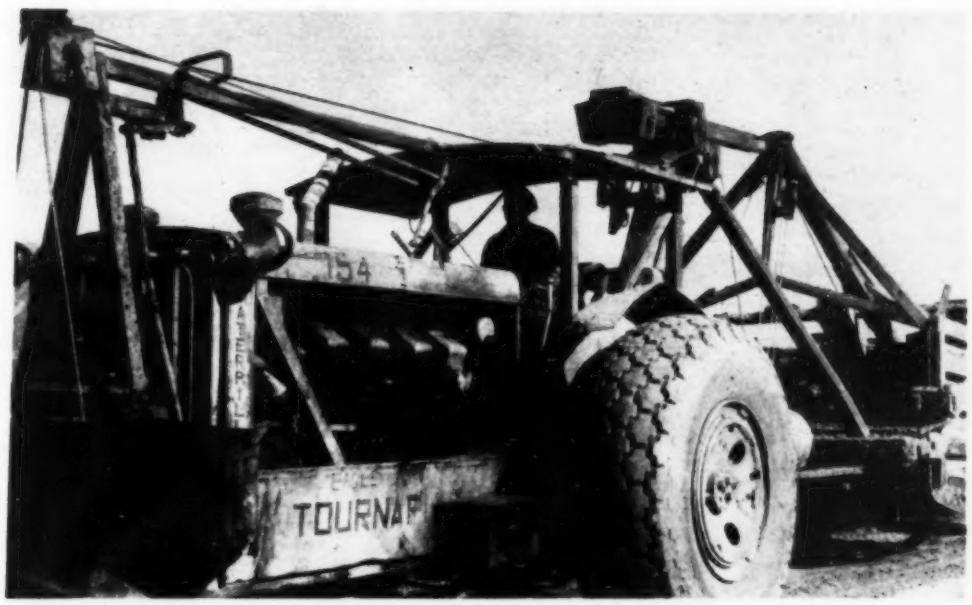


BIDDING AT WHAT IS GENERALLY CONCEDED to be an extremely low figure and assembling $1,250,000 worth of equipment on the $7,000,000 project, the Guy F. Atkinson Co., well-known San Francisco contracting firm, has been the focus of construction attention from far and wide by reason of the methods and the plant it has been using on the Hansen dam, world's largest dry-earth fill of 14,700,000 cu.yd. being built under the direction of the U. S. Engineer Department near Los Angeles, Calif., for purposes of flood control. The price for excavation and hauling material for this record-size earth embankment was only 14½c. per cubic yard and with allowances for sprinkling, compacting, scarifying, etc., the total unit price, in place, averaged only 20.7c. per cubic yard, despite the fact that the material had to be transported an average of 1 mi. and compacted in layers, according to Army Engineer specifications, in a dam 100 ft. high and some 9,000 ft. long.

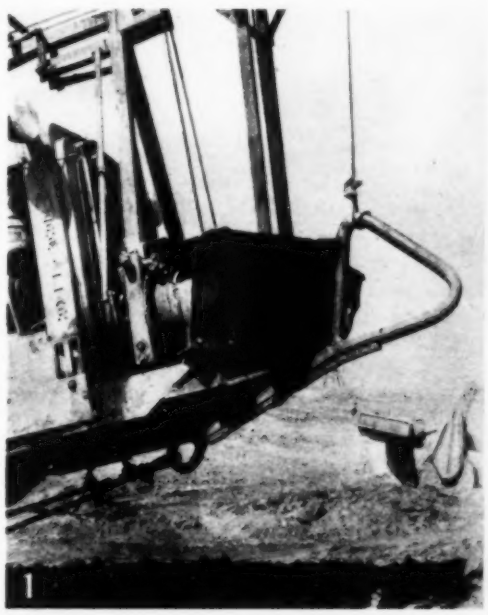
Worthy of particular mention is the fleet of 15 Tournapulls hauling carryall scrapers, marking the first extensive use on a major project of this new LeTourneau equipment. The Tournapull is a fast moving two-wheeled tractor powered by a 160-hp. V-8 diesel engine and carried on huge (24x32-in.) pneumatic tires having an overall diameter of 6 ft. 8 in. It hauls a 25-cu.yd. carryall scraper which is loaded with the aid of two tractors, one, in front, pulling and the other, behind, pushing. This earth-moving unit travels at speeds on level ground of from 12 to 14 m.p.h., loaded, and from 16 to 18 m.p.h., empty. Caterpillar tractors also were much in the limelight and in addition to the 23 machines on the job, other uses of Caterpillar diesel motors brought the total for the job up to 50.

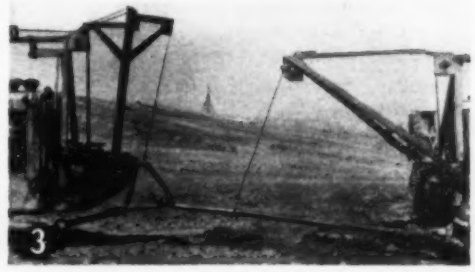
Compaction of the earth fill deposited in the impervious zones of the big em-

(Continued on page 99)

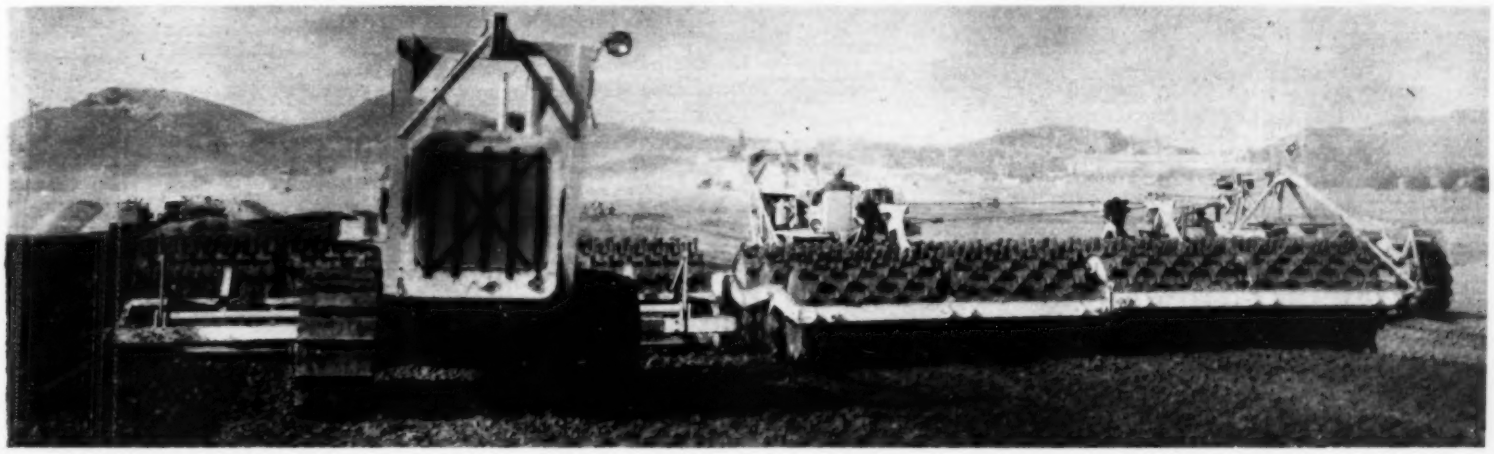


HUGE PNEUMATIC TIRES on two-wheeled 160-hp. tractor drawing carryall scraper are 24x32-in. size, with an overall diameter of 6 ft. 8 in. Tires are valued at $1,500 each.





COUPLING DETAILS for auxiliary puller and pusher tractor connections with tractor-scraper units. (1) COUPLING LINK suspended from front end of Tournapull enables puller tractor to hook on quickly to speed loading of scraper. (2) SPECIAL HOOK on rear end of 125-hp. tractor is swung to engage link on front of Tournapull. (3) READY FOR PULLING with hook on tractor engaging link on Tournapull cables from link run back to connection with axle, leaving Tournapull free to tilt regardless of tractive pull from tractor ahead.



COMPACTION OF EARTH FILL is accomplished by eight passes of sheepsfoot rollers drawn by Caterpillar tractors. Each roller is made up of two 4-drum units mounted in heavy steel frame 22 ft. wide.

Faster Dirt

with the NEW 6-SPEED C

High and

THE *only* Tractor on the market in its power and price class, with 2 reverse speeds! And the 3.4 M. P. H. high reverse and complete range of forward speeds mean *more dirt per hour!*

Both Gasoline and Diesel models have reinforced track frames. The new gasoline Model B has a 15% larger engine—a full 50 H. P. on the belt. Both have electric starting as standard equipment also radiator, crankcase guards and steel engine panels at no extra charge.

It's a *Newer, Bigger, Faster, Better* Tractor!

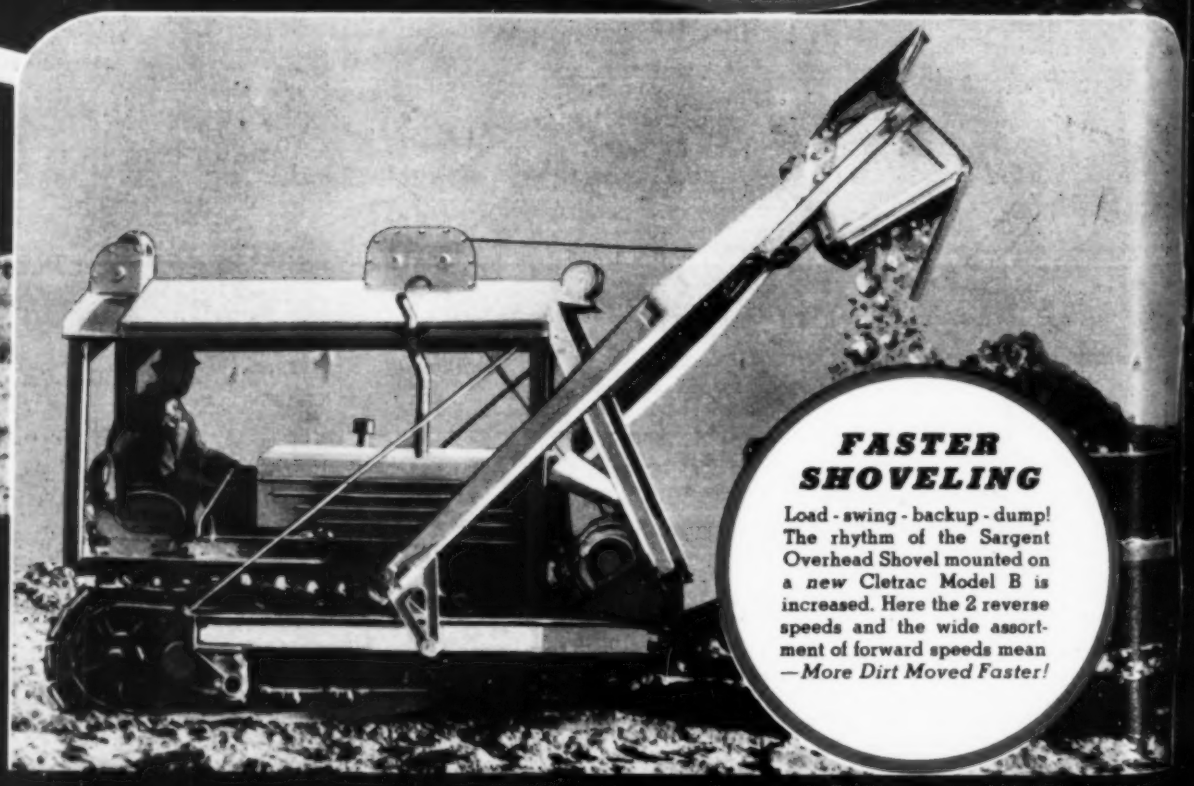
THE CLEVELAND TRACTOR CO.
CLEVELAND, OHIO

FASTER LOADING

With a Cletrac Front End Loader on the New Model B, larger loads can be picked up and dumped, due to increased power and the new 6-speed range. Again, *More Dirt Moved Faster.* And the loader has been improved to operate 30% faster than formerly.

Save Time—Cut Costs through these CLETRAC FEATURES

1. Controlled differential positive steering—both tracks under control at all times.
2. Higher protected clearance.
3. Triple-sealed against mud and grit.
4. Easier service and quicker adjustments for motor, clutch, steering and track.
5. Electric—easier starting tractors.



FASTER SHOVELING

Load - swing - backup - dump! The rhythm of the Sargent Overhead Shovel mounted on a *new* Cletrac Model B is increased. Here the 2 reverse speeds and the wide assortment of forward speeds mean *—More Dirt Moved Faster!*

Moving!

Cletrac Model "B", 38 Drawbar H. P.

gh and Low Reverse Speeds — **Gasoline or Diesel**

STARTING

Start at the touch of a button! Cletrac has used electric starting as standard equipment since 1929.

FASTER BULLDOZING

Thru its high speed reverse and greater power, the New Cletrac Model B can shuttle back and forth at greater speeds and with a bigger bladeful with any bulldozer. *More Dirt Moved Faster.*

A COMPLETE LINE OF

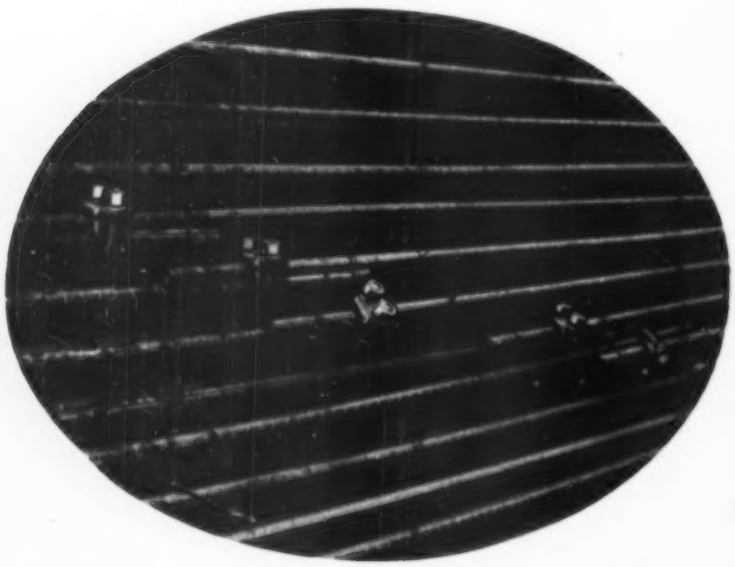
CLETRAC CRAWLER TRACTORS

14 TO 95 HORSEPOWER — GASOLINE AND DIESEL

HOW Helpful

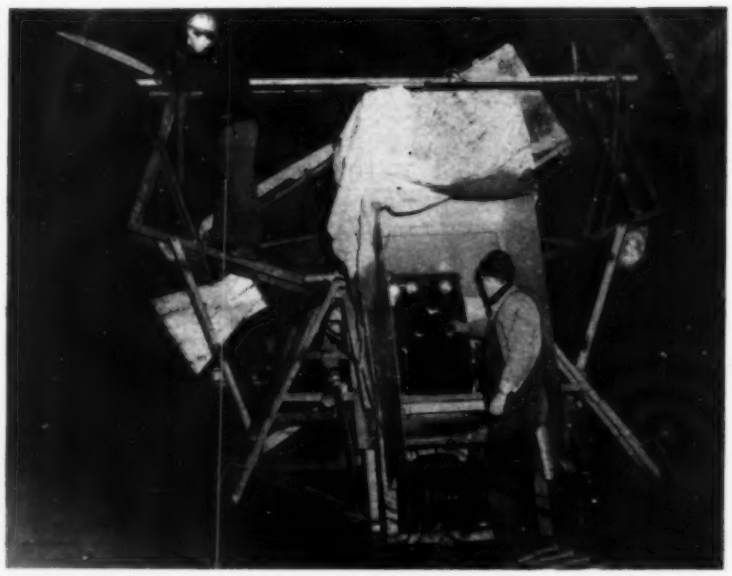
CONSTRUCTION DETAILS For Superintendents and Foremen

RECOIL DEVICE, consisting of ratchet and pawl mechanism mounted on front sprocket axle of Cleveland tubular-frame drill rig, acts to hold machine consistently to its work without cramping or crowding and prevents excessive "bouncing back," so that drill bit is always at right distance from rock for efficient cutting. Air-operated mechanism on drill rig working in Fairfax Quarry at Bull Run, Va., releases pawls when operator wishes to raise drill or feed out of hole.



SPLICING OF STEEL BARS for circumferential reinforcement on large circular concrete sludge tank at sewage treatment works in San Antonio, Tex., is accomplished readily with use of Crosby clips, designed primarily for fastening wire rope used on derricks, cranes, shovels and guys. Clips, consisting of drop-forged steel base and threaded U-bolt, are applied to lapped ends of ¾-in. steel bars each 60 ft. long, spliced to form hoops 240 ft. in diameter.

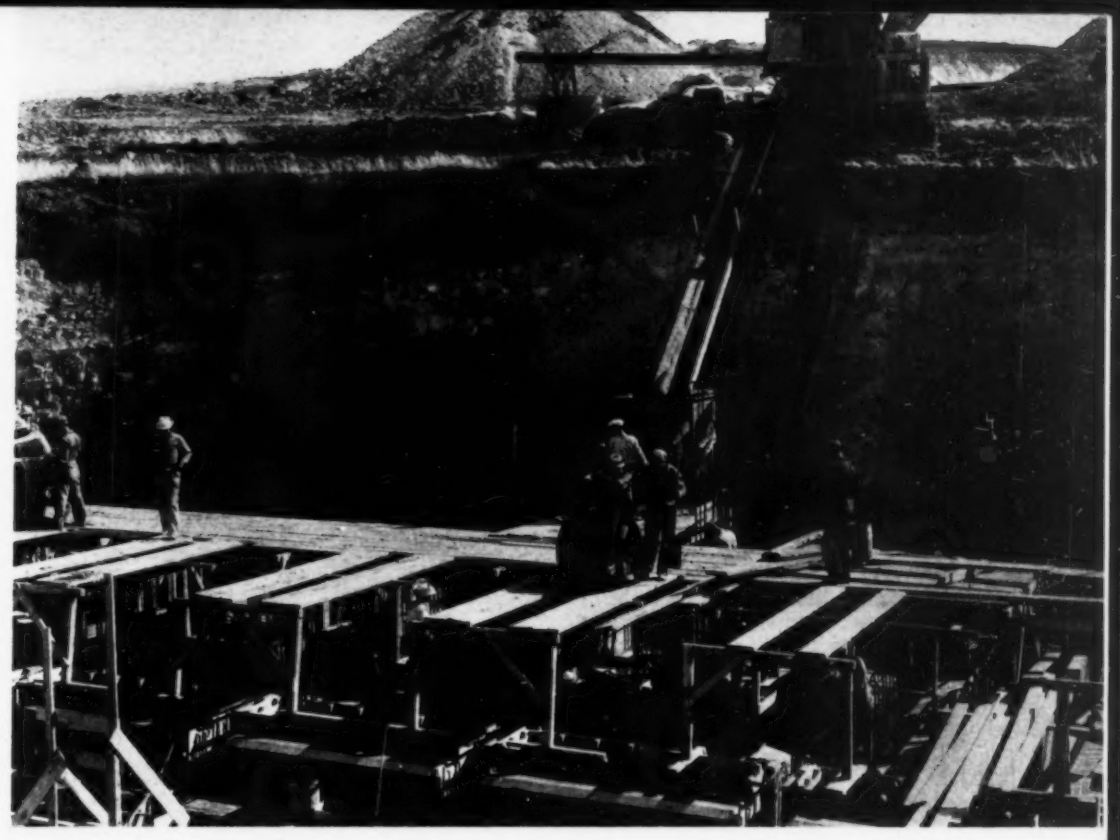
LUMBER CARRIER at waterfront yard in Wilmington, Calif., 24 mi. from project, aids handling of 8,000,000 b.-ft. for Wyvernwood private rental housing project built by Lindgren & Swinerton, Inc., at Los Angeles, as described in CONSTRUCTION METHODS last month.



TESTING OF WELDED JOINTS in 18-ft.-diameter steel penstock liners at Grand Coulee dam, U. S. Bureau of Reclamation project on Columbia River in Washington, is done by mobile X-ray machine.

WOOD BAFFLES TO PREVENT SEGREGATION (left) of material are installed in inclined gravel chute leading down to concrete aggregate stockpiles at Green Mountain dam, 270-ft. high earth and rock fill embankment being built in Colorado for U. S. Bureau of Reclamation by Warner Construction Co., of Chicago, Ill.

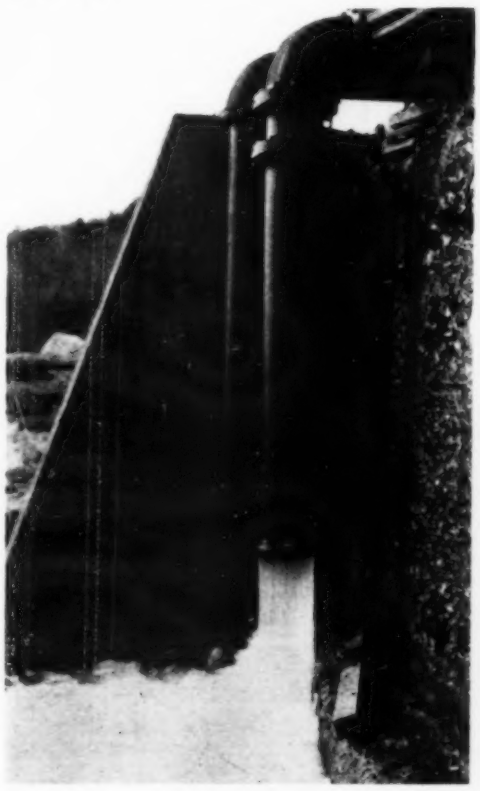
TRIP HAMMER SHARPENS BUILT-UP TOOTH for 5-yd. shovel dipper of Pacific Constructors, Inc., at Shasta dam. When point of tooth-and-shank unit becomes dull, piece of main leaf from Caterpillar D8 tractor is upset and welded to dulled tooth, according to G. L. Malan, shop foreman. Air-operated cable hoist helps blacksmith support tooth on hammer anvil.



GRAVITY FLOW from paving mixer to floor hopper and from carts into forms facilitates distribution and placing of concrete in pumping plant No. 4 of Contra Costa canal, 46 mi. in length, being built as part of Central Valley project, California, under direction of U. S. Bureau of Reclamation.

CORRECTION — In the caption to the picture on p. 59 of the March issue, showing excavation of trench in sandy soil for new water supply pipe line at Grand Rapids, Mich., credit for the well-point system used by Fry & Kain, contractor, to keep the trench dry was improperly given; the well-points on this section of the project were supplied by the Moretrench Corp., of Rockaway, N.J.

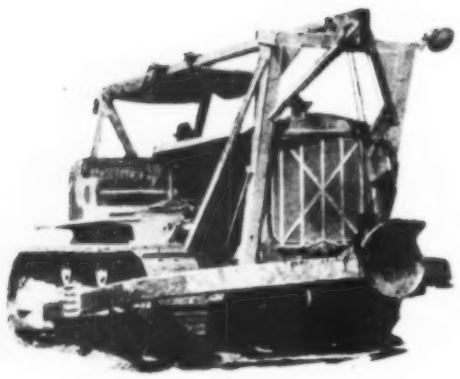
PNEUMATIC-TIRED TRAILER is used by Ed. H. Honnen Construction Co., of Colorado Springs, to handle, two lengths at a time, extra heavy steel pipe for line up Pike's Peak to serve Colorado Springs, Colo. With wall thicknesses of 1⅛ in. to withstand static head of 2,421 ft. (1,051 lb. per square inch) each 17-ft. length of 24-in. O.D. pipe weighs 5,900 lb.



SIPHONS REMOVE LARGE VOLUME OF WATER from behind cofferdam utilized by Sanders Engineering Co., Portland, Me., in reconstructing dam on Saco River at Hiram, Me., for Cumberland County Power & Light Co. Three siphons (right), 6-in., 8-in. and 10-in. in size, are started easily by means of pitcher pump tapped into top of each pipe, with outlet end of siphon submerged few inches below surface of water-filled drum. When water begins to flow, after very little priming, valve in pump connection is shut, and drum is removed from discharge end (left). Largest siphon starts as easily as smallest. After unwatering close to inlet end of siphons, 6-in. valve is placed in discharge end of one siphon to hold water at desired level.—Photos from C. C. CHESLEY, superintendent, Waterbury Center, Vt.

Pusher Tractors

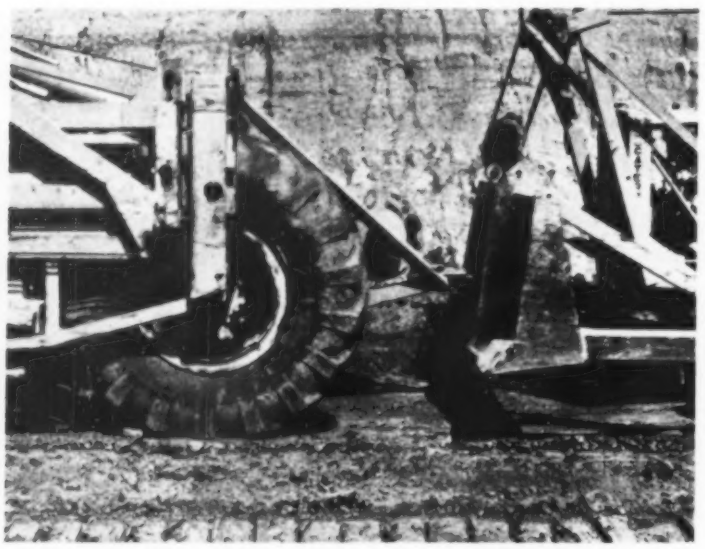
SPEED SCRAPER LOADING ON PENNSYLVANIA TURNPIKE



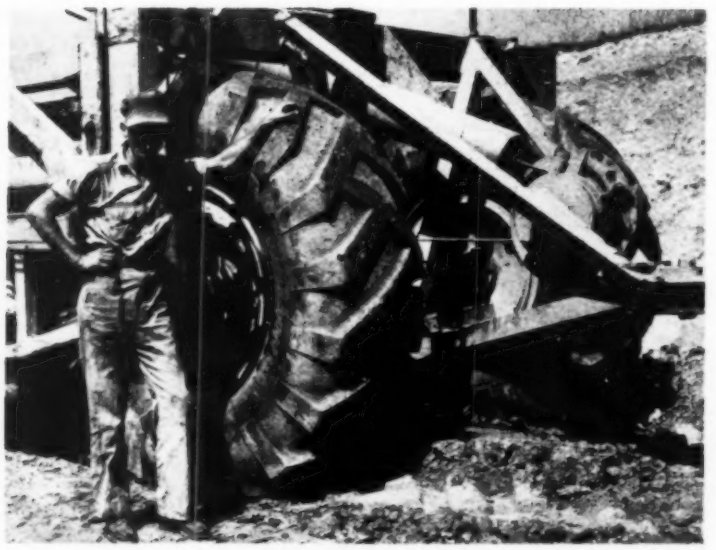
PUSHDOZER ATTACHMENT on 97-hp. diesel tractor carries special cup on welded frame to concentrate pushing effort against nub at rear end of second scraper in tandem train, illustrated by photograph on next page.

BROAD BUFFER PLATE of pusher attachment for 106-hp. diesel tractor **(right)** is mounted on two side members supported by rollers which allow assembly to move in line with main frame, thus permitting two large coil springs to absorb shock and transmit thrust to body of tractor. Plate 42 in. wide by 32 in. high assures contact with rear bumper of scraper in uneven terrain and allows pusher operator some lateral movement.

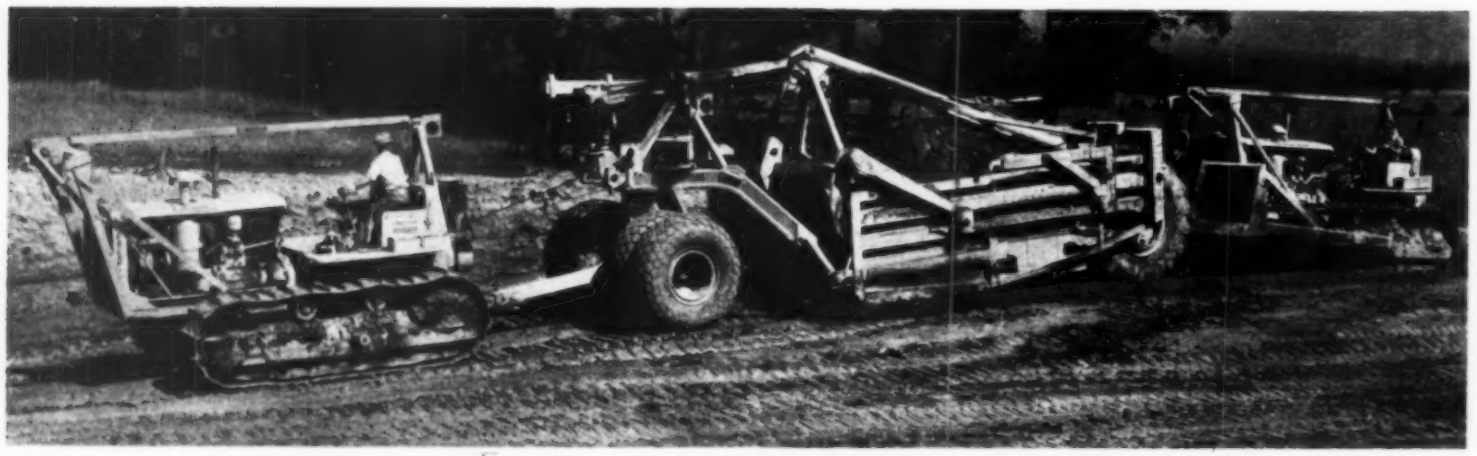
TO SPEED SCRAPER LOADING, reduce loading distance and increase yardage per load, a number of grading contractors on the Pennsylvania Turnpike have used pusher tractors behind their scrapers in the loading pits. Many of the scrapers were designed for pusher loading, but pushers have been employed in numerous cases with tractor-scraper units which were capable of loading without such assistance. Accompanying photographs illustrate representative methods of pusher loading on the Turnpike.



REINFORCED PUSHDOZER PANEL on bulldozer blade makes contact with swivel bumper block at rear end of frame on 30-yd. scraper.

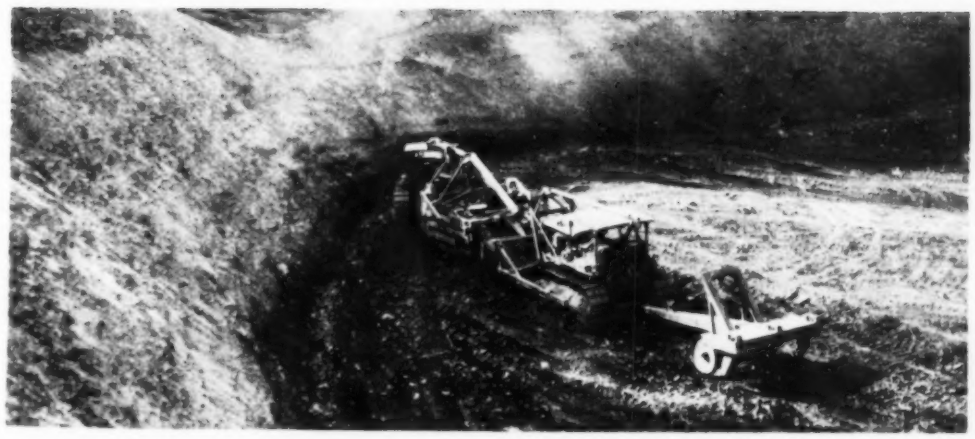


SWIVEL BUMPER BLOCK at right, permits full contact with pushdozer panel and centralizes pushing effort of tractor-bulldozer behind 30-yd. scraper equipped on rear wheels with pneumatic-tires 80 in. in diameter by 24 in. wide.



DESIGNED FOR PUSHER LOADING. Le Tourneau 22-yd. telescoping double-bucket scrapers carrying heaped loads of 30 cu.yd. are drawn by Caterpillar 97-hp. diesel tractors and are pushed while loading by another 97-hp. diesel unit on contract of C. J. Langenfelder & Son, Rosedale, Md. Scrapers pick up full heaped load, estimated by contractor to contain 22 pay yards, in distance of 300 to 400 ft., and each tractor-scraper unit averages five loads or more per hour, moving nearly 1,000 pay yards in 8 hr., on maximum one-way haul of 1,400 ft.

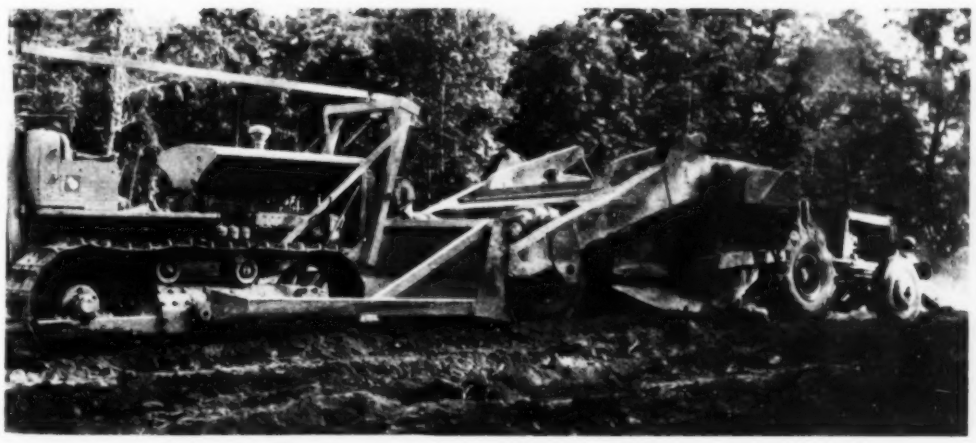
TRIPLE-PURPOSE PUSHER TRACTOR (right) operates rooter to loosen tough shale or uses bulldozer blade to smooth hauling roads when it is not applying power to assist loading of Le Tourneau 12-yd. scrapers grading Ft. Littleton interchange for Dalton Bros., contractors, Paoli, Pa. Combination of rooting and pusher loading eliminates need of blasting shale at this location, where full-circle hauling track of scrapers permits steady forward movement favorable to maximum production in gouging heavy cut out of steep hillside and placing material in fill.

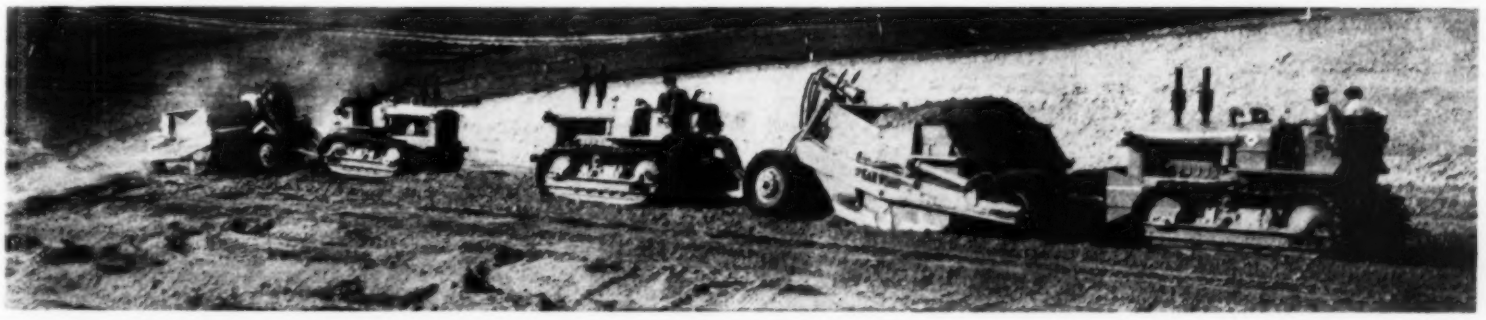


FULLY LOADED (right) with assistance of pusher tractor, tandem Le Tourneau scrapers of 15- and 12-yd. capacities start trip to dump behind Caterpillar 97-hp. diesel tractor on grading contract of Guthrie-Marsch-Peterson Co., Chicago, Ill. Added power of pushdozer unit makes tandem operation feasible in excavating rooted shale. To avoid stalling or buckling of train, rear scraper is loaded first and forward scraper, second.

BULLDOZER ATTACHMENT (right) on Caterpillar 50-hp. tractor serves to push Gar Wood 12-yd. scrapers (drawn by Allis-Chalmers 80-hp. diesel tractors) while loading on subcontract section of A. A. White, Inc., Lebanon, Pa., for Central Pennsylvania Quarry Stripping & Construction Co., general contractor, Hazleton, Pa. Loading in 150 to 200 ft., scrapers average eight loads of 7 pay yards per hour on overall one-way haul distance of 700 ft.

DESIGNED FOR SPEED (right) in hauling rather than for tractive capacity in loading, pneumatic-tired tractor-scraper units utilize pusher tractors during loading operation, as indicated by this Euclid 12-yd. machine being loaded with help of Caterpillar 97-hp. diesel tractor-bulldozer on contract of H. W. Shaull & Son, Mechanicsburg, Pa. Powered with Cummins 150-hp. diesel engines and geared to travel at top speed of 20 m.p.h., Euclid units on Turnpike jobs average up to 90 pay yards an hour on hauls of 1,500 to 2,000 ft. In other parts of country, similar units have given economical service on shorter hauls and on longer hauls up to 5 mi. in length.

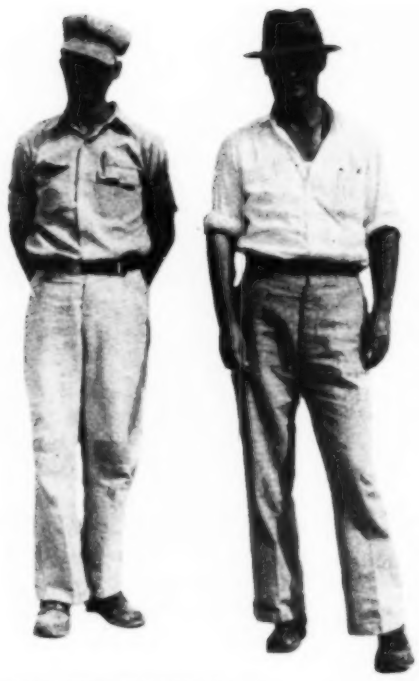




SERVING FOUR UNITS powered by Allis-Chalmers 106-hp. tractors equipped with General Motors two-cycle diesel engines, fifth similar tractor pushes Gar Wood scrapers of 15-yd. heaped-load capacity on section graded by Herman Holmes, Crystal Falls, Mich. Moving 365,000 cu.yd. of earth, shale and rock (including much material broken by ripper or by blasting) this fleet compiles following average figures: Pay load, 8.9 yd.; loading time, 1.3 min.; loading distance, 120 ft.; round-trip haul, 2,250 ft.; fuel consumption, 5.1 gal. per hour for scraper and 3.5 gal. for pusher. Depending upon material moved, ranging from earth to blasted rock, each scraper averages from 99 to 53 pay yards per hour on one-way hauls of 940 to 1,000 ft. Tractor of 27,000-lb. bare weight has six forward speeds from 1.72 to 7 m.p.h. and two reverse speeds of 2 and 3.20 m.p.h.

Step-by-Step Field Methods

HOW TRAVELING HOPPER MOLDS SEPARATING CURB ON DIVIDED HIGHWAY

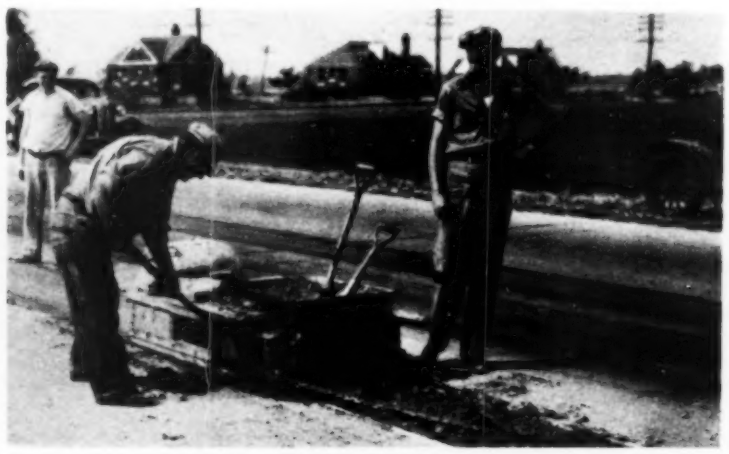


CURB CONSTRUCTION on 2-mi. section of divided highway is directed by W. T. WILLIS (left), superintendent for Hoeffken Bros., and J. K. LANGFORD, resident engineer for Illinois Division of Highways.

A SIMPLE AND EFFECTIVE OUTFIT improvised for the purpose by Hoeffken Bros., contractors, Belleville, Ill., built concrete separating curb for four-lane divided roadway on U. S. 50 east of French Village, Ill., under the direction of the Illinois Division of Highways. After widening the existing road for 2 mi. on their contract section by addition of a second 22-ft. slab, Hoeffken Bros. used a traveling hopper, drawn forward by a small tractor-powered winch, to mold a combined curb and gutter 2 ft. wide and 4 in. high on top of a lower course of concrete fill between the two roadways. Photographs on these pages show how the equipment enabled a small crew to build separating curb with truck-delivered pre-mixed concrete at an average rate of 1,000 lin.ft. per 8-hr. day. Curb construction required about 1 cu.yd. of concrete for 6 lin.ft.

1 **TRAVELING MOLDBOARD,** shaped like inverted flume for striking off curb concrete, is equipped with open-top hopper to receive concrete from truck mixer moving forward in unison with it. Hauling rope from small winch on tractor (partially visible over right fender of truck) pulls molding outfit ahead as it deposits concrete for upper lift of separating curb in 2-ft. space between roadways.

2 **THIN DISK WHEELS** hold rear end of molding outfit in line against concrete slabs as it is drawn forward on sled runners. Added weight above moldboard prevents unit from rising as it strikes off concrete to desired profile.



3 **CHAIN BRIDLE AND SHEAVE** at front of molding outfit connect unit to three-part line operated by winch on tractor. Spud pins at front of outfit keep it in line with edges of concrete slabs as work moves forward.

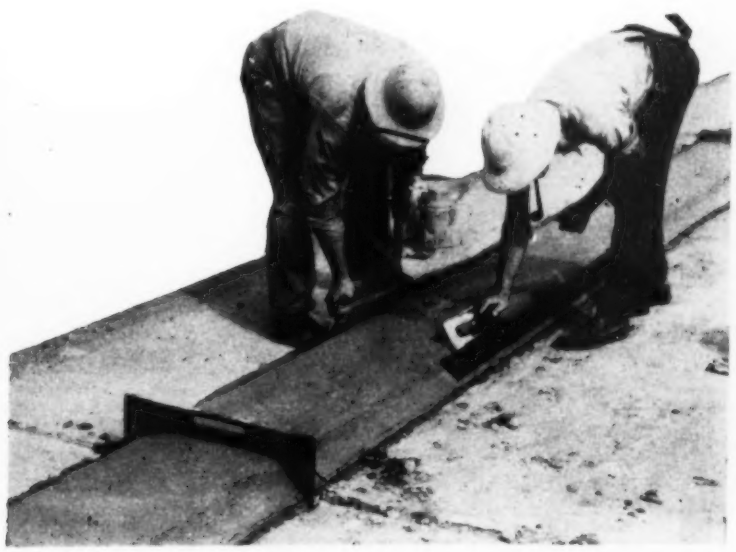
4 THREE-PART HAULING LINE runs to Clyde winch on Fordson tractor. Doweled expansion joints and contraction joints have been set in trench between roadway slabs.

5 FIRST LIFT OF CONCRETE in trench 10 in. deep between slabs is consolidated by Jackson hydraulic vibrator. One hose from portable gasoline-engine-driven pump is for high-pressure oil; second hose is for return line.

6 SPECIAL FLOAT starts finishing of desired Ogee curve along edge of separating curb 4 in. high, designed to prevent unnecessary cross-overs by vehicles but made low enough to permit such crossings without accident when necessary.

7 TO IMPROVE VISIBILITY for night driving, edges of curb are indented at 25-ft. intervals by 4-ft. 10-in. panels designed with five tapered lugs to form wedge-shaped depressions. Illinois Division of Highways is experimenting with paint in these depressions to determine maximum visibility, painting entire depressed panel in some cases and small upstanding surfaces only in others. Black stripe 10 in. wide is painted down center of curb for entire length.

8 DEPRESSIONS ARE FORMED in curb edges by pressing wood panels into soft concrete and tapping them with hammers.



9 WITH PANELS IN PLACE, workmen use small hand floats to form rounded tops of Ogee profile.

FOR SAFE SERVICE *Chains and Hooks* REQUIRE REGULAR INSPECTION

By W. ELWOOD ROSSNAGEL,
Safety Engineer,
Consolidated Edison Co. of New York, Inc.

CHAINS WERE AT ONE TIME used almost exclusively for heavy hoisting on machines, such as cranes, but today they have been largely superseded by wire rope. There are some jobs, however, to which chains are better adapted than wire rope, and hence there are still a large number of chains in use on construction work.

A link of a chain consists of two sides, either of which, in failing, causes it to open up and drop the load. A wire rope, on the other hand, is usually composed of 114 individual wires, all of which must fail before it parts. Chain may thus be said to have less reserve strength, and it should, therefore, be more carefully inspected. In the case of hand-forged chain the welds depend largely upon the human element.

When a wire rope is fatigued from severe service the wires break one after the other over a period of time, and thus afford the inspector an opportunity to discover the dangerous condition. If severely overloaded, the wires and strands will break progressively over a period of perhaps several seconds, and with resultant noise, before complete failure occurs. This affords the men handling the load a brief time in which to run to safety before it is dropped. Chains, on the other hand, usually fail without any previous warning — just one loud snap and the load instantly falls. Steel chains, however, are considerably more resistant to wear, corrosion and abuse in handling than wire rope, particularly when used for slings.

Let us consider the inspection of steel chains from a safety viewpoint. All chains should be inspected at least once a month by a competent inspector. Those used in handling hot metal in foundries should be inspected weekly. Every chain, either attached to a piece of equipment or used as a sling, should be given a serial number which may be stamped into the end link or ring, or on a metal tag to be attached to the chain.

Heat-Treatment—All sling chains should be annealed or normalized at least once a year, and all crane and hoist chains in active service should be heat-treated in this manner at least once in two years. After six such annealings they should be discarded. Heat-treating should be done only by those having the knowledge and the proper facilities for doing this work. It is recommended that all chains be returned to the manufacturer for this heat treatment.

At his periodic examination the inspector should carefully look over the entire length of the chain. Particular attention should be paid to the wear where the adjacent links bear upon each other. Fig. 1 gives the approximate breaking strength which a chain may be expected to develop when the metal in the ends of the links has been reduced from the original dimension, B, to the worn dimension, A. Of course, this strength should be divided by a factor of safety (5 is recommended) to obtain the safe working load. In no case should dimension A be permitted to become less than about 75 per cent of B.

The inspector should pay special attention to the condition of the welds, particularly forge welds. The ends of the scarfs should be watched for cracks or separation of the metal. If gouges or cuts are observed in the links they should be carefully inspected. If the cross-section of the link is materially reduced, that link should be cut open and removed from the chain. Watch all sharp nicks and cuts, as it is in these spots that cracks will usually start.

Cracks— Any link which shows evidence of a crack should be removed from the chain without hesitation. Where a crack is suspected, the link may be soaked in thin oil and then wiped dry. A coating of powdered chalk or other white material is applied to the surface and allowed to remain there

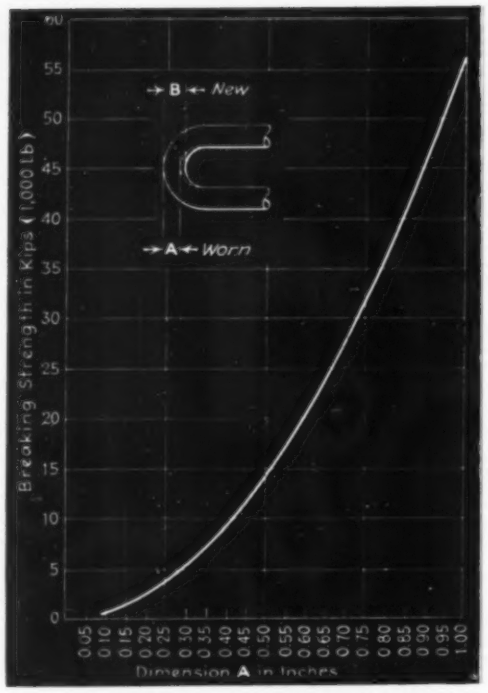


Fig. 1 . . . **STRENGTH OF WORN STEEL CHAINS.** Dimension A should never be less than two-thirds of dimension B.

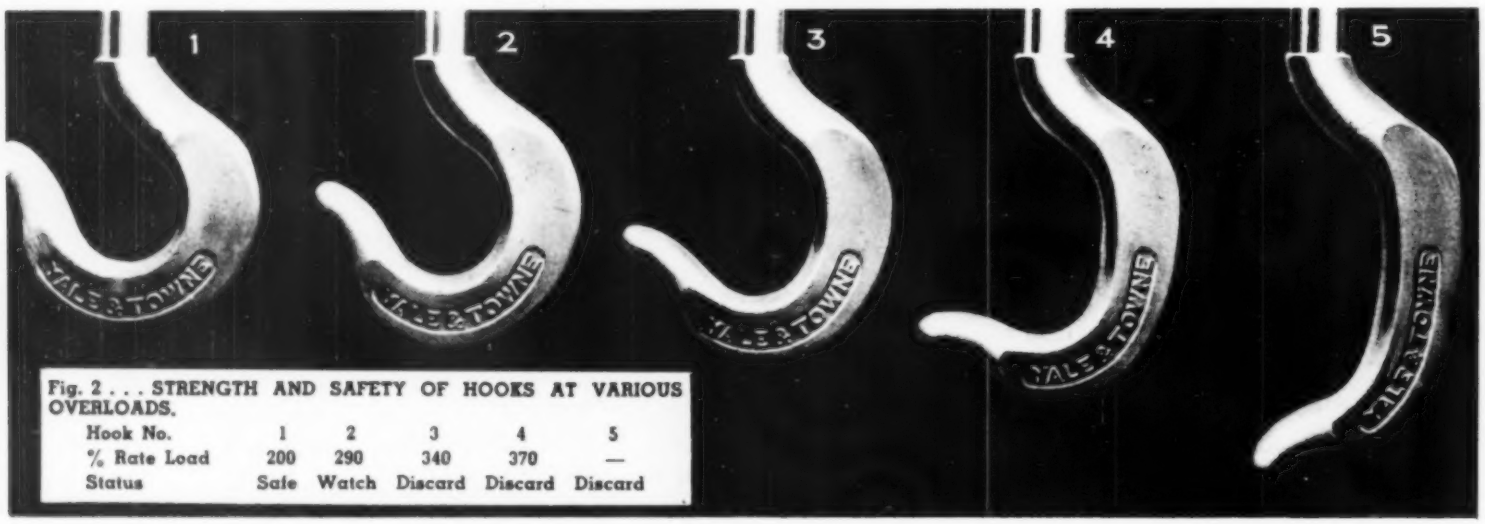


Fig. 2 . . . STRENGTH AND SAFETY OF HOOKS AT VARIOUS OVERLOADS.

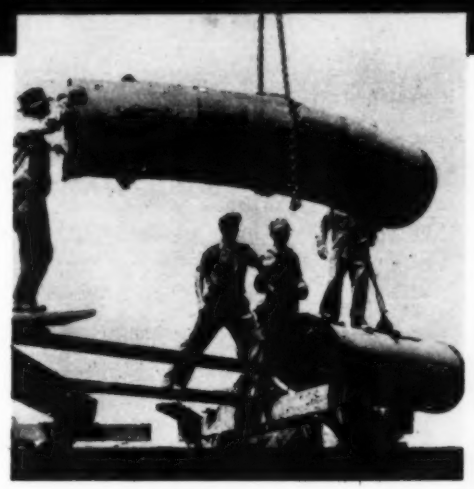
Hook No.	1	2	3	4	5
% Rate Load	200	290	340	370	—
Status	Safe	Watch	Discard	Discard	Discard

CHAIN SLINGS find wide range of uses in construction field.

for several hours. If a crack exists, the oil pocketed in it will be drawn out by capillary action and will noticeably discolor the white coating. Small dents similar to peen marks on the surface of the links, or even a bright or polished surface, usually indicate that the chain has been work-hardened or fatigued. Where this is in evidence, the chain should be annealed or normalized. Links which have been crushed or bent should be removed from the chain.

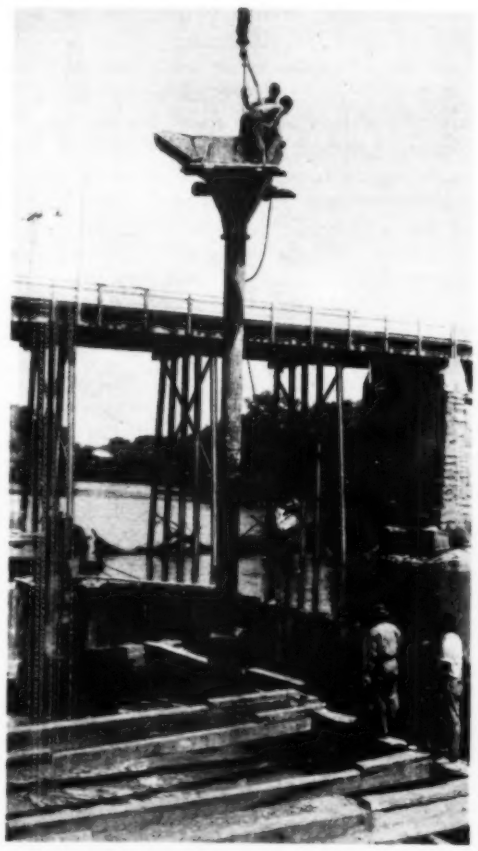
It is desirable to check up on the stretch of the chain. If it has been overloaded to the extent that the links are distorted and bind on each other, the chain should be condemned. It is recommended that when a new chain is received the inspector should accurately measure its length between definite points. On a sling, the length may be taken as the distance between the bearing points of the ring and the hook. On a long chain center-punch marks are sometimes placed on the links at a defi-

(Continued on page 107)



Job-Built Tremie

PLACES QUALITY CONCRETE



READY TO BE LOWERED into water, tremie suspended on load line of crane carries attached platforms for workmen.

A JOB-BUILT CRANE-SUSPENDED TREMIE used by Arthur Terwilliger, general superintendent, on substructure work at the Deerfield-Sunderland, Mass., bridge across the Connecticut River for the C. J. Maney Co., Inc., contractor, Boston, consisted of an electrically welded hopper and a discharge chamber connected by 12-in. pipe, with a hinged gate in the discharge chamber controlled by the closing line of the crane, as shown by a sketch reproduced with these notes. Similar equipment had previously been built and operated by Mr. Terwilliger in constructing piers of the Middletown-Portland, Conn., bridge over the same river for the Merritt-Chapman & Scott Corp.

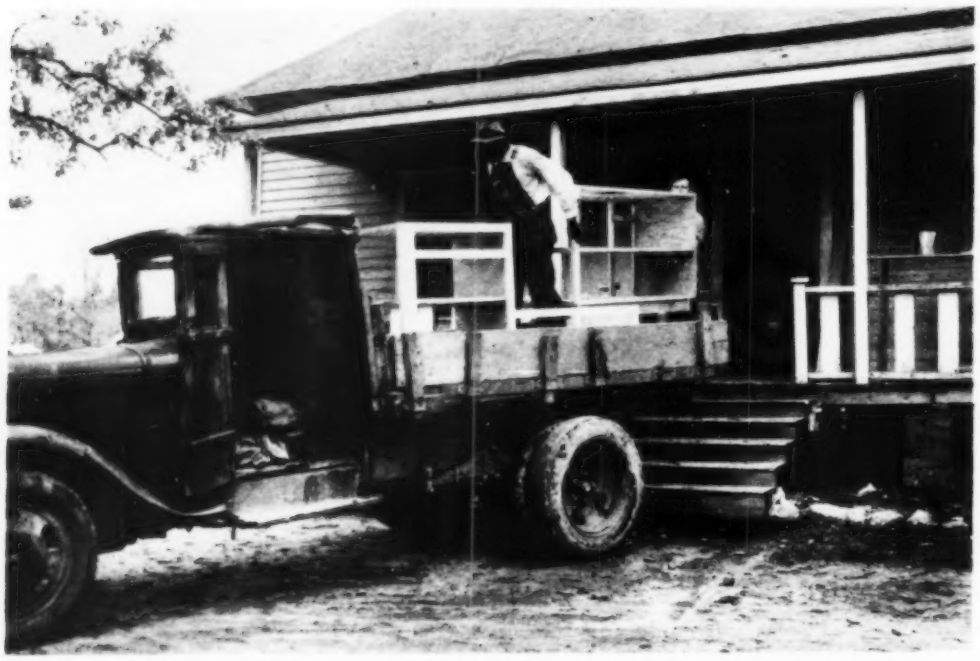
According to T. H. Sellew, Jr., who served as an engineer on both projects,

(Continued on page 106)

TREMIE HOPPER receives concrete from bucket handled by second crane. Small crew performs all work required by tremie operation.

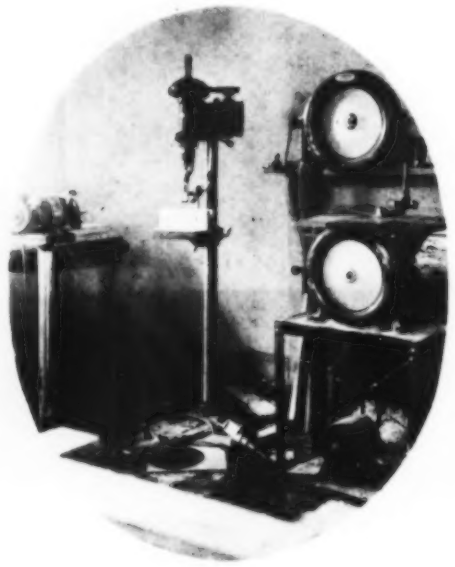
Small Shop On Job

TURNS OUT WOODWORK FOR BUILDER OF BRICK HOUSES



SMALL WOODWORKING SHOP in abandoned cottage builds shelves, cabinets, doors, screens and other units for brick houses.

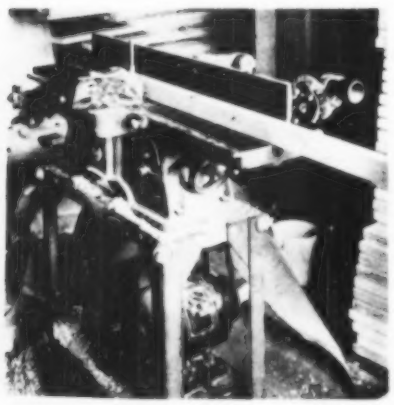
COUNTERWEIGHTED to pull away from work when foot is removed from pedal, this saw can be turned to cut bevel while guide on table is set to cut miter.



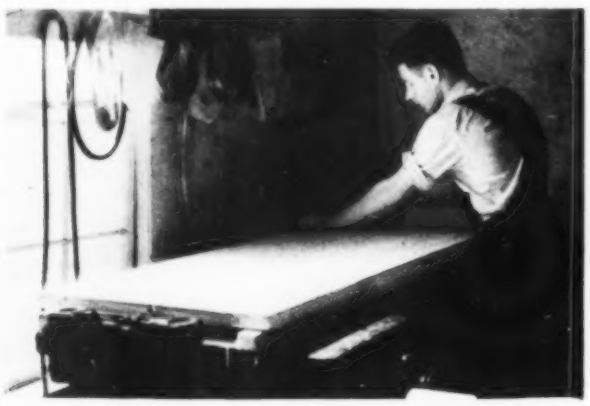
MOTOR-DRIVEN TOOLS. emery wheel, drill press and bandsaw, speed operations in woodworking shop. Drill press is equipped to mortise screen doors. Lying on floor at base of drill press is one of two portable electric drills.

A TWO-MAN WOODWORKING SHOP equipped with nine power tools produces doors, screens, cabinets, tables, louvers and back-porch roof brackets for brick houses built and sold at the rate of one a week by L. Neal Smith near Emory University, Ga., a short distance northeast of the Atlanta city line. Economical design and construction procedure enable the builder to put five-room one-story houses of 1,100-sq.ft. inclosed area on 50x200-ft. lots with brick garages for a sales price of $5,000. The properties represent sound value and are approved for FHA financing.

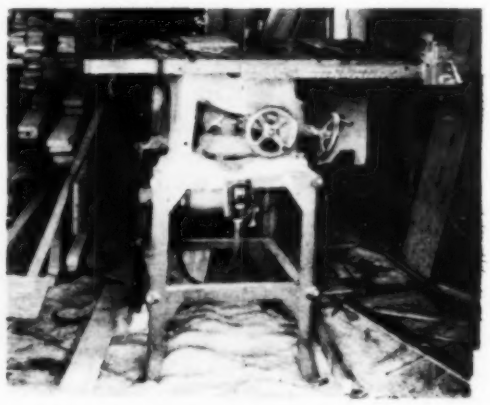
Power Tools—A compact assembly of work benches and electric power tools in an abandoned bungalow serves C. Z. Smith, brother of the builder, and his assistant in turning out woodwork items for the houses. The power equipment includes a Driver 2-hp. 10-in. circular saw; a Driver ½-hp. joiner, a Craftsman ⅓-hp. drill press for mortising screen doors, a Craftsman ⅓-hp. drill press, two Black & Decker portable drills, a ¾-hp. emery wheel, a table saw counterweighted to pull away from the work,



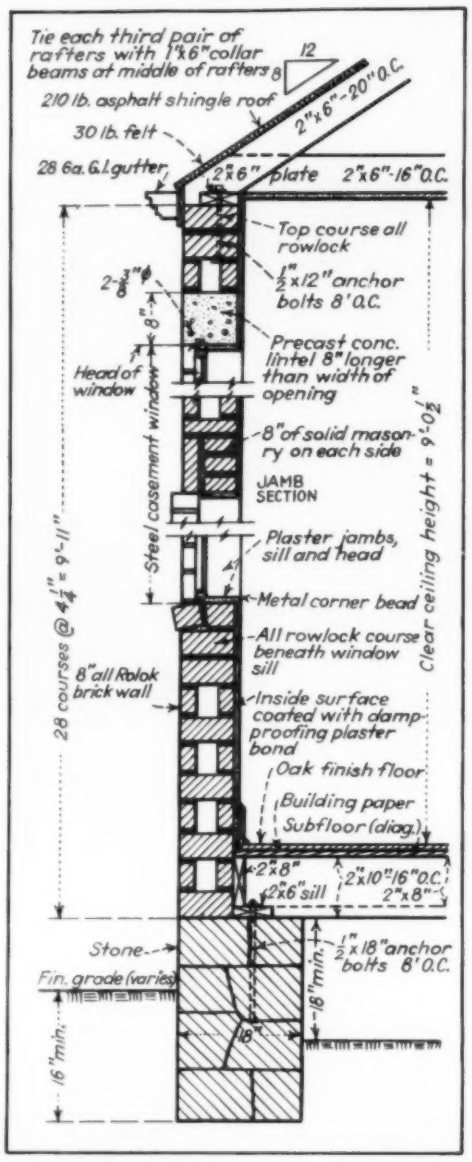
JOINER powered by ½-hp. electric motor performs many woodworking tasks, including planing, cutting and grooving.



INTERIOR DOORS are made up of 1⅛ in. t.&g. yellow pine frames glued and nailed, covered on both sides with ¼-in. three-ply plywood, also glued and nailed.



10-IN. CIRCULAR SAW powered by 2-hp. motor makes quick work of cutting heavy pieces.



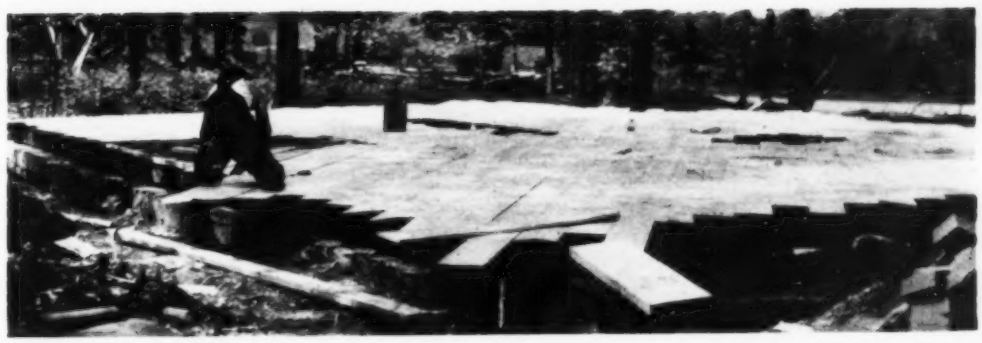
EXTERIOR WALLS of one-story brick houses are laid up All Rolok bond. Builder uses pressed concrete brick made with granite dust in these walls, but in some cases faces exterior with red clay brick, as indicated by accompanying photograph.

and a belt sander built by C. Z. Smith to dress pieces to line. Accompanying photographs show the power tools.

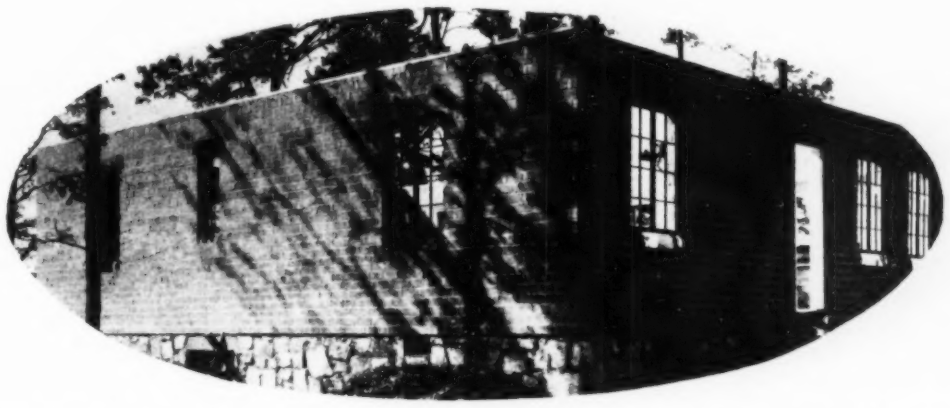
Building Program — Ordinarily the builder starts about ten houses in a group and employs a working force of his own comprising ten carpenters, six painters and four men for cement and yard work. All other work is let by the piece to subcontractors. In starting the first group of ten houses on a new tract of 75 lots, Mr. Smith had two rock mason contractors on foundation walls and one brick mason contractor, working several crews, on superstructure walls. Metalwork, roofing, electrical work, heating and plumbing, plastering and tilework were all performed under subsequent separate contracts.

Granite Products — Because of the proximity of the Stone Mountain granite quarries, Mr. Smith utilizes rubble granite masonry for the foundation walls and pressed concrete brick made with granite dust (byproduct of the quarries) for the house walls. Brick

(Continued on page 108)

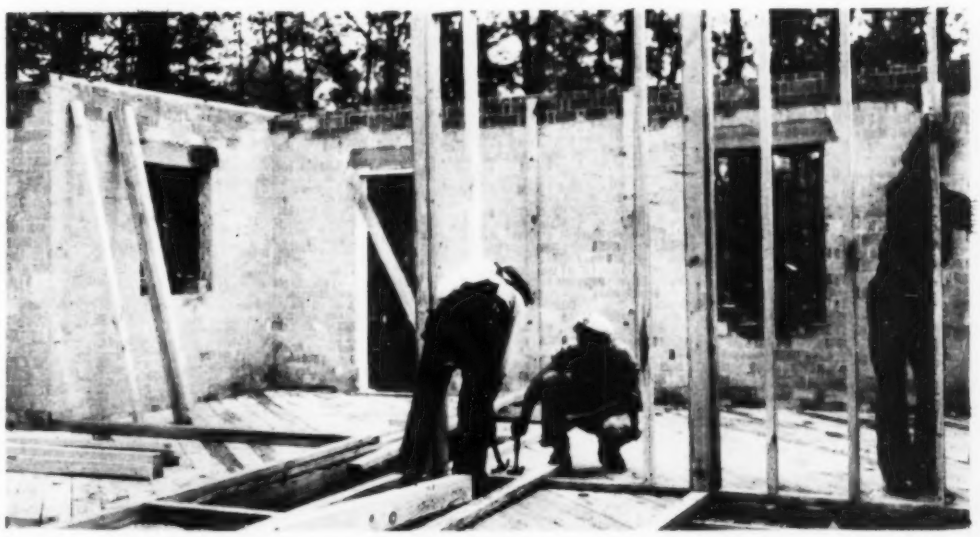


DIAGONAL SUBFLOORING is laid before bricklayers start wall construction. All sills and girders on top of foundation walls are leveled, shimmed up with slate or brick, and thoroughly grouted under with cement mortar.



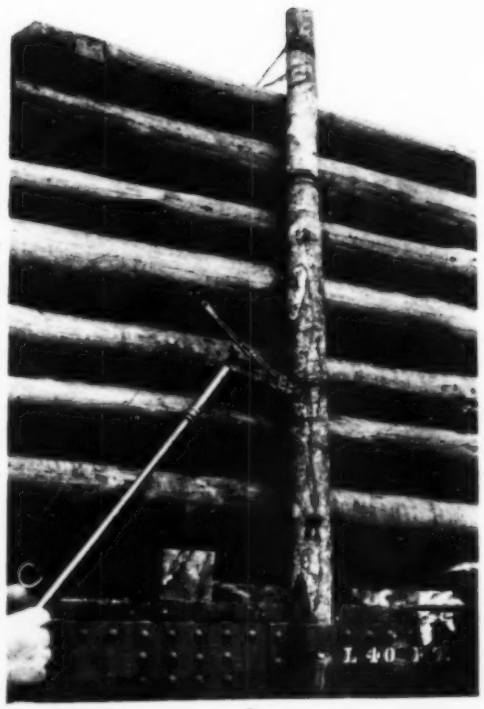
COMMON RED CLAY BRICK furnish exterior facing of these superstructure walls, laid up All Rolok bond. Sloping ground at this location permits garage to be built into basement, with entrance at rear of house.

CONCRETE BRICK fill in between headers on inside of house wall faced with red clay brick. Note precast concrete lintels over windows and door openings.



PARTITIONS have 2x4-in. studs set 16-in. on centers. Where end partitions connect to outside masonry wall, in background, they are anchored to brickwork with three 1/2-in. bolts equally spaced between floor and ceiling.

SMALL TOOLS ON CONSTRUCTION



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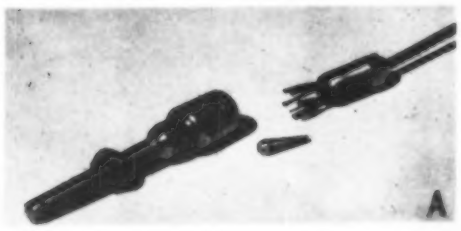
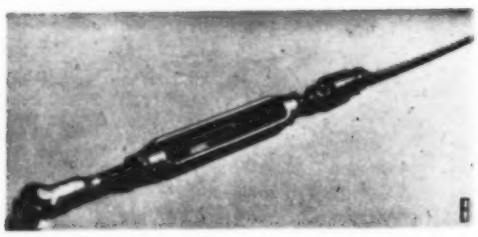




3

4

5

1 **REMOTE CONTROL** is feature of this H. K. Porter extension wire cutter. Mounted on long pipe handle, this cutter is operated by cable from end of one handle and easily reaches places difficult of access.

2 **TOOLS FOR HIGHWAY MAINTENANCE** are part of regular equipment of this truck, designed by R. L. Fielder, district mechanic of Texas Highway Department. Held by brackets on side of truck body and stamped with number of truck are shovel, axe, sledge hammer, pick and crowbar. Behind cab in body of truck is hinged seat which may be folded up out of way when not occupied by workers en route to or from job.

3 **SPLICING OF WIRE ROPE** is simplified and speeded up by using this Fiege fitting, made of Monel metal to resist corrosion. Wire rope is first passed through smaller part of fitting (A) and strands are broomed out to receive metal plug placed in center. Then smaller part of fitting is screwed into larger part (B), as plug serves as wedge to hold strands firmly in place.

4 **PNEUMATIC IMPACT WRENCH** aids crew of Ed. H. Honnen Construction Co., of Colorado Springs, Colo., in tightening nuts on bolts of flanged joints in 24-in. high pressure steel pipe line on Pike's Peak built under direction of E. L. Mosley, city manager, to serve city of Colorado Springs. Use of this tool, instead of long-handled wrenches, resulted in minimum expense for bell-hole excavation, as very little operating clearance was required on under side of pipe joint.

5 **TAPPING OF LIVE WATER MAIN** for service connection under pressure is done with this Mueller machine employed by Department of Water Supply, Gas and Electricity of New York City.

Present and Accounted For

A PAGE OF PERSONALITIES

FEDERAL AID FOR HIGHWAYS elicits expert testimony during House committee hearings in Washington: (Left to right) CHARLES M. UPHAM, engineer-director and secretary, American Road Builders' Association; MURRAY D. VAN WAGONER, ARBA president and Michigan highway commissioner; Representative WILBURN CARTWRIGHT, of Oklahoma, chairman of U. S. House roads committee; THOMAS H. MACDONALD, U. S. public roads commissioner; and HAL G. SOURS, ARBA president-elect and chief engineer, Ohio Department of Highways.

SHASTA DAM CONSTRUCTION is up for discussion as WALKER R. YOUNG (left), supervising engineer of Central Valley project, and RALPH LOWRY, construction engineer at Shasta, listen attentively to IVAN E. HOUK, in cap, senior engineer in charge of technical studies for U. S. Bureau of Reclamation.

AQUEDUCT CONTRACTORS building 85-mi. deep rock tunnel, dam and appurtenant works for Delaware River water supply system meet in offices of New York Board of Water Supply on Dec. 2, 1939 (date of thirty-first annual dinner of General Contractors' Association of New York) to line up with Board officials for this photograph.

(1) John M. Carroll, auditor, (2) Walter E. Spear, chief engineer until his death, March 29, 1940, (3) Henry Hesterberg, commissioner, (4) George J. Gillespie, president, (5) Rufus E. McGahen, commissioner, (6) Charles M. Clark, chief engineer, (7) Richard H. Burke, Jr., secretary, New York City Board of Water Supply.

(8) Louis J. Salmon, chief engineer, (9) Merle R. Miller, general superintendent, and (10) Stephen A. Healy, president, S. A. Healy, Co.

(11) Thaddeus Merriman, consulting engineer until his death, Sept. 26, 1939.

(12) Thomas J. Walsh, president of Walsh Construction Co. and of Associated Contractors, Inc.; (13) David Small, vice-president of Walsh Construction Co. and of Associated Contractors, Inc.; (14) John S. Macdonald, chief engineer, Walsh Construction Co., and vice-president and chief engineer, Associated Contractors, Inc.; (15) J. Henry Gill, vice-president, Walsh Construction Co., and vice-president and job manager, Associated Contractors, Inc.; (16) William A. Durkin, vice-president and job manager, Walsh Construction Co.

(17) Charles A. Shea, Jr., general superintendent, J. F. Shea Co., Inc., & Henry J. Kaiser Co.; (18) Edmund H. Shea, secretary, J. F. Shea Co., Inc.; (19) Thomas M. Price, general manager, J. F. Shea Co., Inc. & Henry J. Kaiser Co., (20) Henry J. Kaiser, president, Henry J. Kaiser Co.; (21) Charles A. Shea, president, J. F. Shea Co., Inc.

(22) Samuel R. Rosoff, president, (23) Arthur H. Diamant, vice-president and treasurer, and (24) Fred W. Stiefel, chief engineer and job manager, Samuel R. Rosoff, Ltd.

(25) Edward C. Davis, secretary-treasurer, (26) Adrian W. Frazier, president, and (27) Don H. Blanks, vice-president, Frazier-Davis Construction Co.

(28) Benjamin Arp, general superintendent, and (29) Augustus H. Ayers, job manager, The Utah Construction Co.

(30) Richard W. Remp, general superintendent, (31) E. T. Gott, vice-president, (32) J. Smith Miller, senior vice-president, and (33) Vere B. Edwards, president, Dravo Corp.

(34) Edmund A. Prentis, director, (35) Carl L. Swenson, vice-president, (36) Lazarus White, president, (37) Richard P. King, chief engineer, (38) Jesse R. Glaeser, job manager, and (39) Ray V. Johnson, general superintendent, Pleasantville Constructors, Inc.

(40) Willard G. Triest, president, Triest Construction Co., Inc.

(41) Edward P. Walsh, treasurer of Walsh Construction Co. and of Associated Contractors, Inc.

(42) Louis R. Perini, president, B. Perini & Sons, Inc., and secretary, Seaboard Construction Corp.; (43) James O'Rourke, general superintendent, (44) Arthur A. McLaren, chief engineer, and (45) Harry F. McLean, president, Seaboard Construction Corp.

(46) Francis Donaldson, vice-president, (47) Miles I. Killmer, vice-president, (48) Howard L. King, chief engineer, and (49) Guy W. Sackett, manager, Mason & Hanger Co., Inc.

(50) Angelo E. Ottaviano, president, and (51) Charles MacDonald, secretary and treasurer, Ottaviano & MacDonald, Inc.

THE ONLY PUMP WITH THE

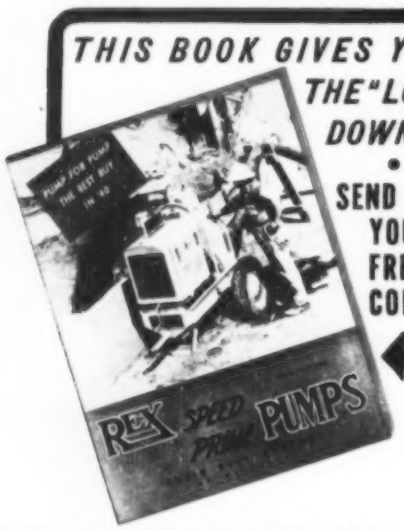
Z-METAL PEELER!

HERE'S WHAT THIS MEANS TO YOU

Standard equipment on all Rex Speed Prime pumps is the Z-Metal Peeler—a sharp-edged casting of corrosion and wear-resistant Z-Metal which removes the air from the impeller, prevents air from rotating around the impeller when the pump is priming, or when the suction line is leaking air. The Peeler gives Rex Speed Prime pumps more air-removing ability than any other good contractor's pump. It enables them to prime faster, hold their prime longer —day in, day out—year in, year out!

Z-METAL IMPELLER, TOO!

The unique Rex impeller, which retains its ability to prime after long years of wear, is made from Rex Z-Metal—an exclusive Rex Speed Prime feature. Z-Metal's strength, toughness and ability to resist abrasion are far greater than malleable iron or semi-steel found in ordinary contractor's pumps. Thus, internal losses are less in your Rex Speed Prime pump. High efficiency is maintained over longer periods of hard work.



Here is the brief, concise story of the superiority of Rex Speed Prime pumps! Be sure you've read it before you buy any pump! Send for your copy. Ask for Bulletin No. 365. Chain Belt Company, Dept. P-5-8, 1664 West Bruce Street, Milwaukee, Wisconsin.

BUY REX AND BE RIGHT!

PUMPS

CONSTRUCTION EQUIPMENT NEWS

(ALL RIGHTS RESERVED)

Review of Construction Machinery and Materials for MAY, 1940

BOTTOM-DUMP WAGON. 200-hp. unit, has struck measure capacity of 18 cu.yd. or heap load capacity of 20.75 cu.yd. on 3:1 slope. Top speed, 25 m.p.h. Equipped with 24.00x32-in. tires, with 18.00x40-in. tires optional. Two improvements: (1) Full floating planetary type axle with total reduction of 25.68:1, claimed to be largest of its type ever made; (2) air-powered and operated dumping doors. Valve on steering wheel opens or closes while wagon is either moving or stationary.—**The Euclid Road Machinery Co., Cleveland.**

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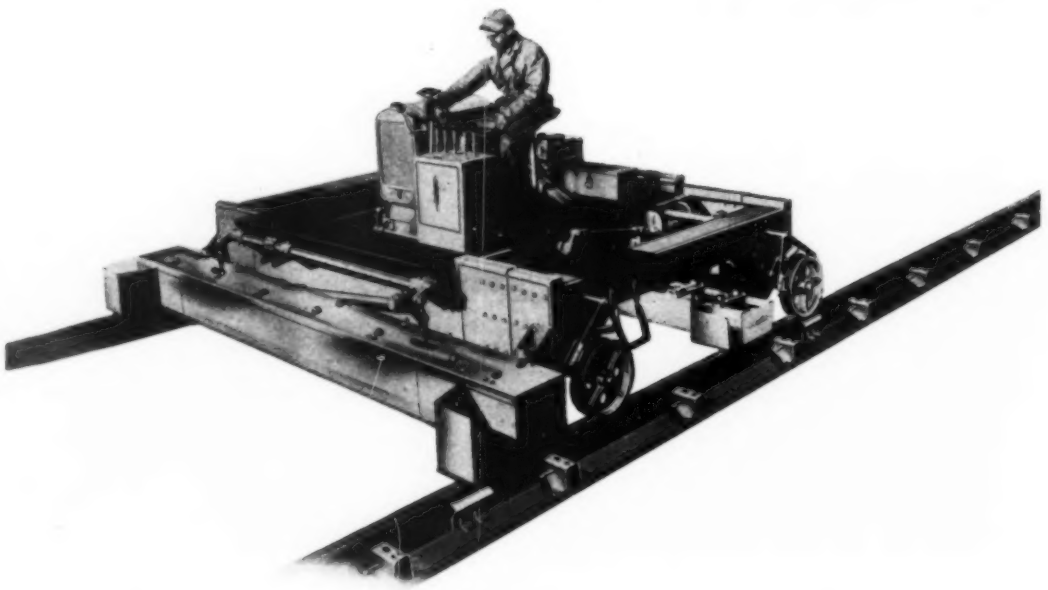
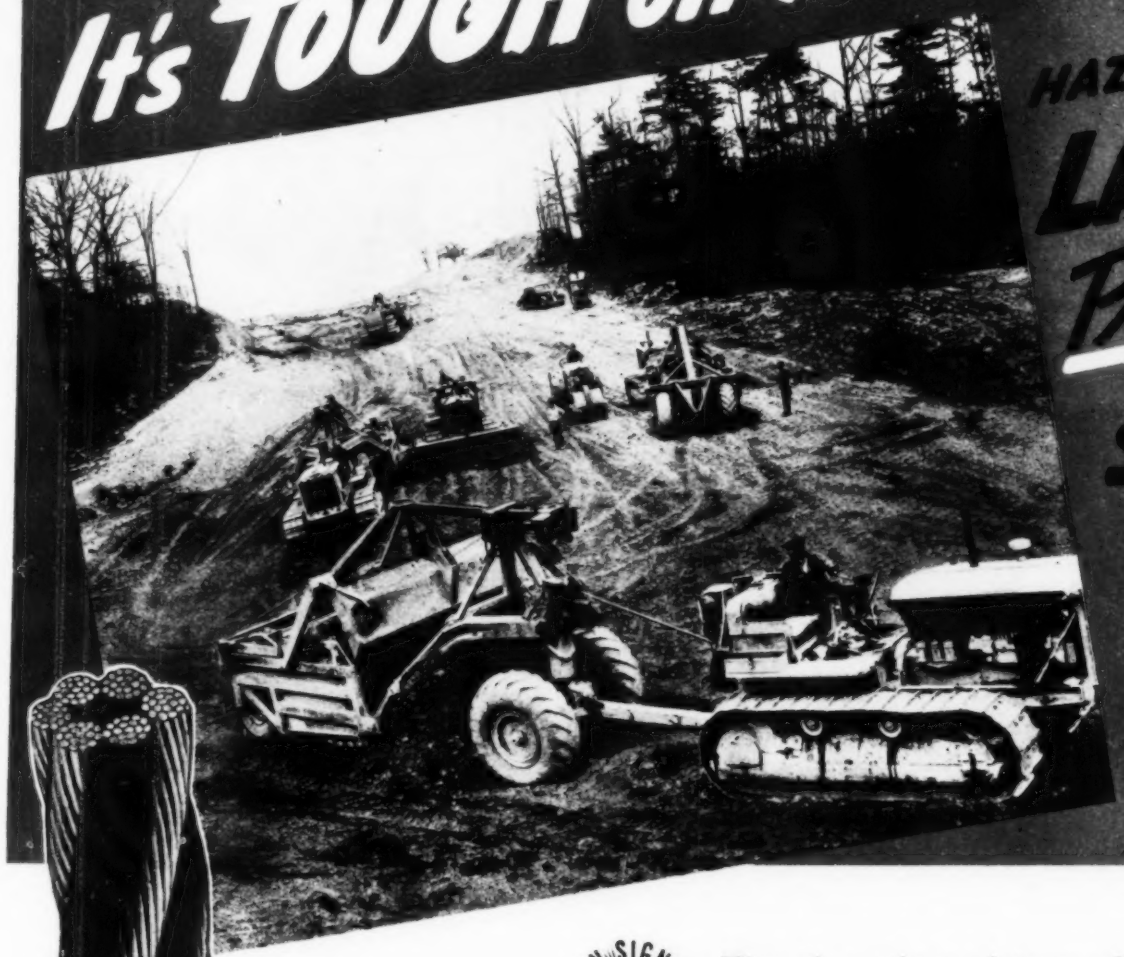


FINISHING MACHINE. "DeLuxe Type H." has been designed to keep pace with 34-E dual-drum pavers and Jaeger screw spreaders on all widths of slab. Heavy-duty automotive type transmission with working speeds up to 18 f.p.m. and traveling speeds up to 100 f.p.m. performs all transmission functions. Four-wheel drive with equal load distribution on all four wheels said to assure maximum traction for these high speeds and for striking off concrete. Self-contained side trucks and center unit make it possible to supply built-in width changes up to 4 ft. by extending telescopic trusses and drive shafts and inserting screed sections. For major width changes up to 32 ft. it is necessary to insert wider trusses, screeds and drive shafts. Width changes ¼ to 3 in. made by shifting washers on square axles. All levers banked within easy reach of operator. Screed speeds controlled independently of traction when gears are shifted, but synchronized with changes of speed by throttle. Screeds driven by spring-cushioned connecting rods to eliminate jerking and lifted separately or simultaneously by hydraulic power lift operated by direct driven pump. Box-type screeds are fully inclosed with two rows of crown adjusting studs, one row across front, other across rear of screed bottom to insure against warping and to provide simple means of putting positive tilt into screed shoe. Crown change screed which requires movement of one lever to change crown overall, may be had. For vibratory concrete, finisher may be equipped to operate with either vibratory tube or vibratory motors mounted on bull-nose front screed to insure deep internal vibration of material.—**The Jaeger Machine Co., Columbus, Ohio.**

It's TOUGH on Wire Rope...

BUT HAZARD LAY-SET Preformed STANDS THE GAFF!



GREEN SIGNIFIES SAFETY

The above is a picture of the Pennsylvania Turnpike in the making. It is also a picture of Hazard LAY-SET Preformed *at work*. Such carryalls and bulldozers are tough on wire rope. That's why Hazard LAY-SET Preformed is a favorite with contractors. It stands the gaff!

And since Hazard LAY-SET Preformed can stand it here—certainly it will give greater dollar value on power shovels, draglines, skip hoists, cement mixers, car retarders and the thousand and one other applications where, actually, the work is easier.

Yes—Hazard LAY-SET Preformed lasts longer. That's because the preforming process eliminates all internal torsional stress; makes the rope flexible, easy to handle. LAY-SET resists kinking and snarling. Broken crown wires don't wicker out to jab workmen's hands. LAY-SET is a safer rope to handle. Specify Hazard LAY-SET Preformed Green Strand for your next line. All Hazard Ropes identified by the Green Strand are made of Improved Plow Steel. And remember: Green Signifies Safety.

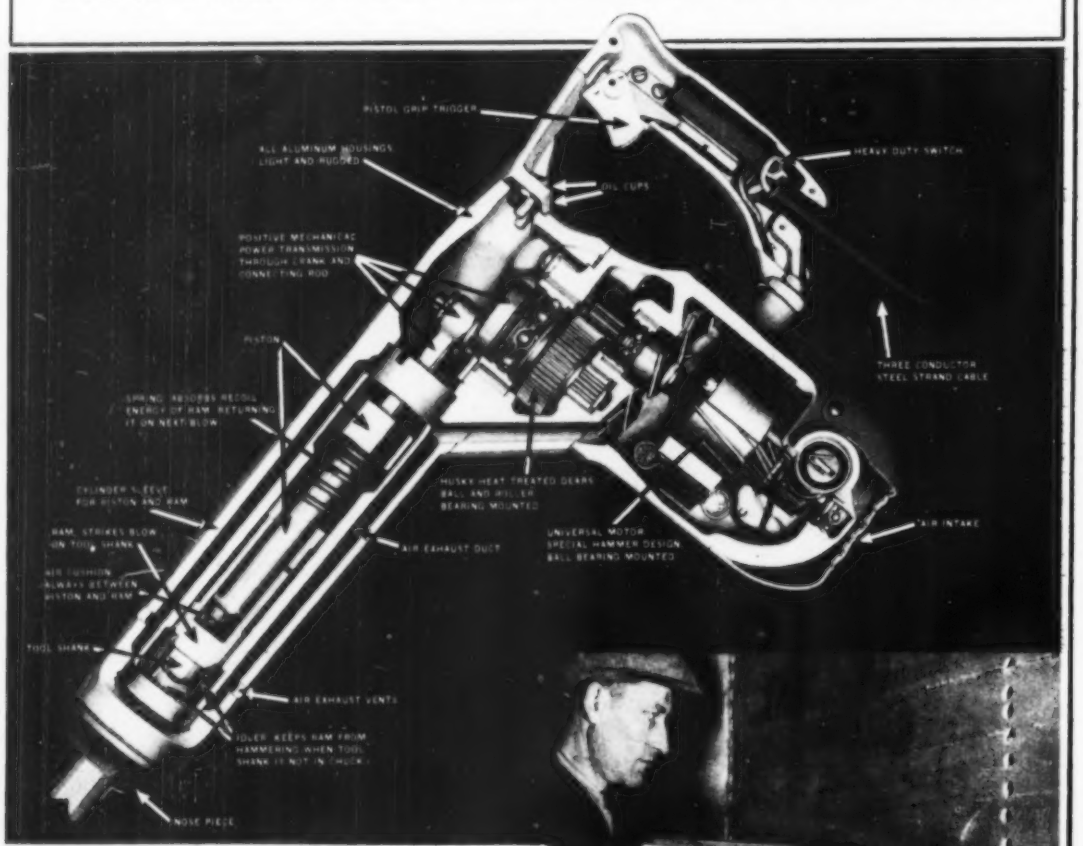
HAZARD WIRE ROPE DIVISION • WILKES-BARRE • PENNSYLVANIA

Established 1846

District Offices: New York, Chicago, Philadelphia, Pittsburgh, Fort Worth, San Francisco, Denver, Los Angeles, Atlanta, Tacoma

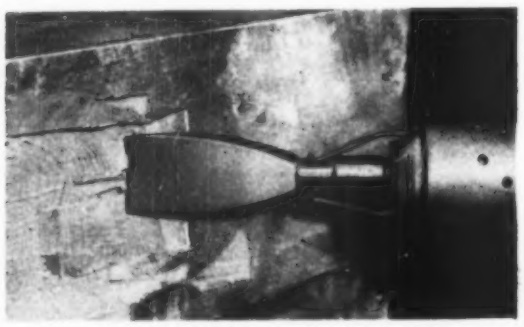
AMERICAN CHAIN & CABLE COMPANY, Inc.

POWERFUL ELECTRIC HAMMERS INTRODUCE NEW HIGH SPEED CONSTRUCTION METHODS


PISTOL GRIP TRIGGER
ALL ALUMINUM HOUSINGS LIGHT AND RUGGED
HEAVY DUTY SWITCH
OIL CUPS
POSITIVE MECHANICAL POWER TRANSMISSION THROUGH CRANK AND CONNECTING ROD
PISTON
THREE CONDUCTOR STEEL STRAND CABLE
SPRING ABSORBS RECOIL ENERGY OF RAM, RETURNING IT ON NEXT BLOW
CYLINDER SLEEVE FOR PISTON AND RAM
HUSKY HEAT-TREATED GEARS BALL AND ROLLER BEARING MOUNTED
RAM STRIKES BLOW ON TOOL SHANK
AIR EXHAUST DUCT
UNIVERSAL MOTOR SPECIAL HAMMER DESIGN BALL BEARING MOUNTED
AIR INTAKE
AIR CUSHION ALWAYS BETWEEN PISTON AND RAM
TOOL SHANK
AIR EXHAUST VENTS
IDLER KEEPS RAM FROM HAMMERING WHEN TOOL SHANK IS NOT IN CHUCK
NOSE PIECE

HERE'S THE INSIDE STORY—told above in diagram. Black & Decker Portable Electric Hammers are precision built, unusually husky, completely self-contained, operate from any electric outlet. They deliver 1,950 to 2,700 smashing, sledge-hammer blows a minute—for driving star drills, diamond points, bull points, cold chisels, bushing tools, wood gouges, wood chisels and other heavy construction tools.

DRILLING, CUTTING THROUGH or channeling concrete, stone or brick . . . removing form marks . . . scuffing concrete or cement surfaces . . . drilling shot holes for blasting . . . are among the jobs which electric hammers do in a fraction of the time required by slow, costly, hand pounding with a sledge or maul. The No. 36 Electric Hammer, largest of the four models in the Black & Decker line, drives a 1¼" diameter star drill to a depth of 5½" in standard mix concrete in 60 seconds!



SHAPING HEAVY TIMBERS with gouges and chisels . . . caulking pipe line joints . . . demolition work . . . scaling and chipping metal . . . are among other jobs on which Black & Decker Portable Electric Hammers introduce new, cost-cutting construction methods.

ON ALL CONCRETE WORK, Black & Decker Portable Electric Hammers tamp and vibrate for a stronger and denser mix—permitting faster stripping of slabs and wider use of form lumber.

LEADING DISTRIBUTORS EVERYWHERE SELL

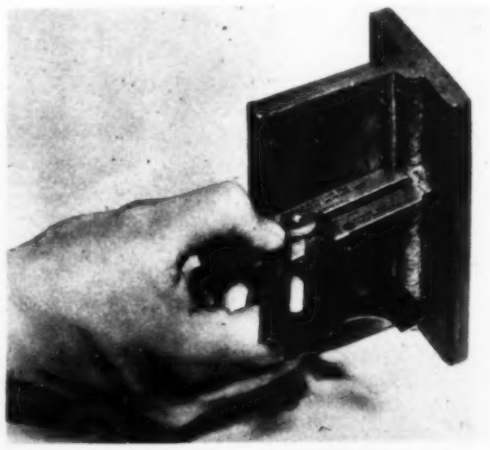
Black & Decker

PORTABLE ELECTRIC TOOLS

FREE to Contractors:

Write for free, illustrated Electric Hammer Handbook—and, if you'd like a demonstration right on the job, ask for that, too. Address: The Black & Decker Mfg. Co., 759 Pennsylvania Ave., Towson, Md.

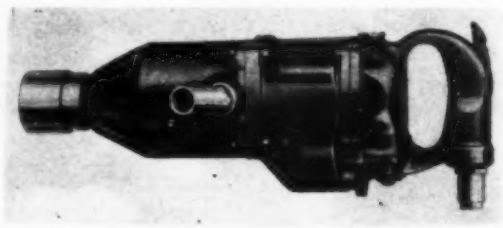
FILLET-WELD GAGE said to meet need of welding inspectors and operators for fast accurate means of checking size of fillet welds on jobs which must meet rigid specifications. Device consists of three stainless steel stampings held together by bolt and



knurled thumb-nut. Either convex, concave or standard fillets can be checked merely by fitting edge of gage flush against work so that indicating portion of gage rests on weld bead. Gage can be used on fillets ranging in size from ¼ to ⅝ in. All sizes clearly marked on gage. — **General Electric Co., Schenectady, N. Y.**

★ ★ ★

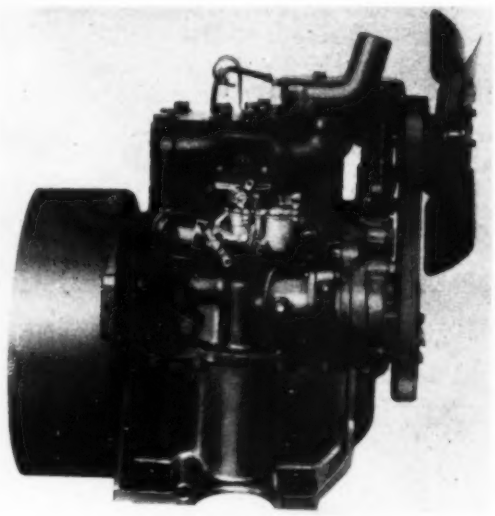
REVERSIBLE PNEUMATIC WRENCHES power-vane type, for removing and applying staybolt caps, dome nuts, smoke box nuts, cylinder and valve chamber head nuts, front end nuts, washout plugs and for use in structural steel work employs slow

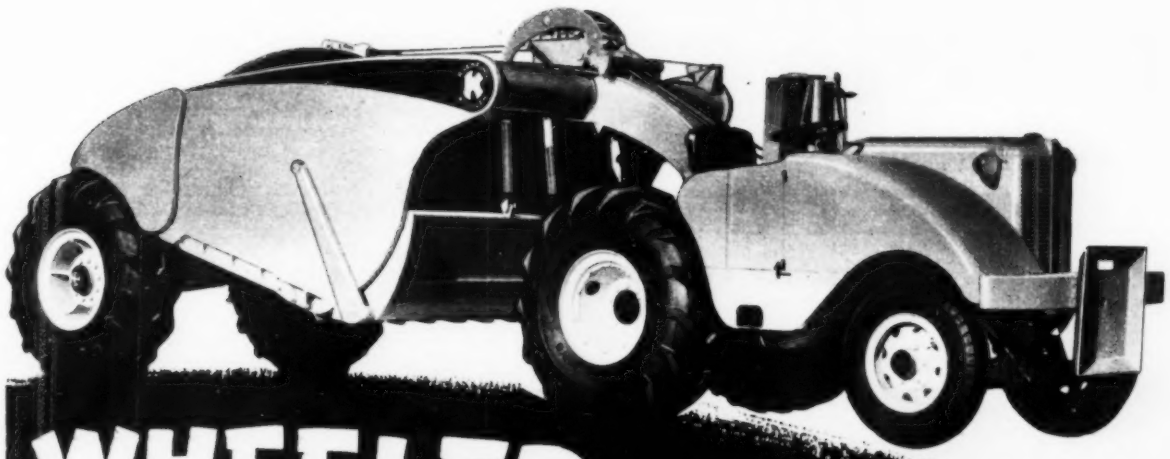


speed rotary motor, simple in design and said to be efficient in operation and economical in maintenance. Have no gears or resilient members in driving units. Light weight and short overall length make them easy to handle. Capacity 1¼-in. bolts; overall length, 16¼ in.; spindle offset, 2¼ in.; shank size, 1 in. square; weight, 27½ lb.—**Chicago Pneumatic Tool Co., 6 E. 44th St., New York City**

★ ★ ★

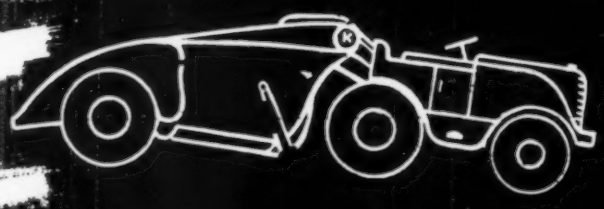
2-CYLINDER HEAVY-DUTY GASOLINE ENGINE AND POWER UNIT, known as BXB, has 2⅞x3-in. bore and stroke and displacement of 39 cu.in. Maximum torque is 28 lb./ft. at 1,200 r.p.m. For continuous peak load service unit may be operated up to 1,800 r.p.m., at which speed it develops 9.2 corrected horsepower. Features: (1) Full force lubrication to all main and connecting rod bearings; (2) lubricating pump located in oil sump and driven by helical



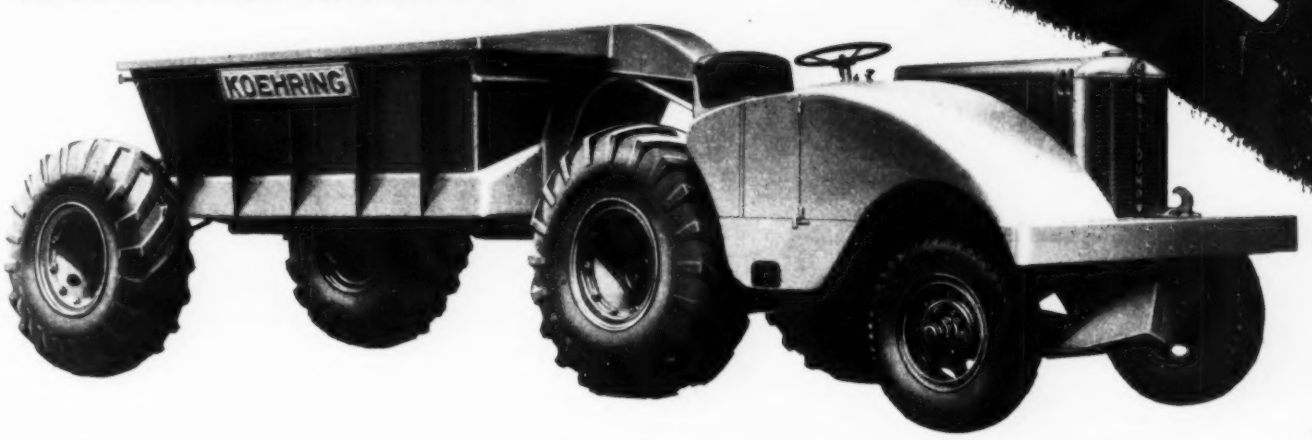


Koehring Wheeler with crawler push tractor loads faster. Travels faster because of high speed rubber tired tractor.

WHEELER *and* TRAIL-DUMP = 2 *in* 1



Koehring Trail-Dump with high speed rubber tired tractor travels faster. Instantaneous gravity dump and "mechanical hand" door wind saves seconds.



2 FOR LITTLE MORE THAN THE PRICE OF 1

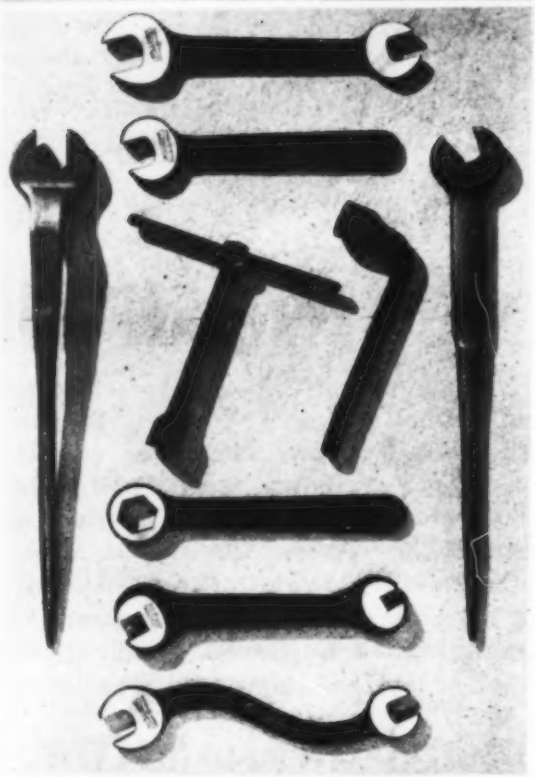
Two types of hauling units in one. Koehring Wheelers are quickly changed to Trail-Dumps. Same tractor, same tires, same wheels and hubs, same hitch . . . only change is the body . . . cable control unit need not be removed . . . Trail-Dump to Wheeler similarly. Different job conditions no longer require investment for complete new hauling systems. Change is easily and quickly made on the job. For little more than the price of one you now can own *two complete hauling systems* . . . the Koehring Wheeler, push-loading, high speed unit . . . or the Koehring Trail-Dump loaded by shovel, dragline, clamshell or elevating grader. Descriptive bulletins of the Trail-Dump and Wheeler will be mailed at your request.

KOEHRING COMPANY · MILWAUKEE, WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

TWICE AS STRONG
AS OLD-STYLE CARBON STEEL WRENCHES



● In Williams' "Superior" Wrenches you get just about twice the strength of old-fashioned carbon wrenches. These Improved tools are forged from specially-processed carbon steel and average 93% as strong as the finest corresponding alloy wrenches which sell for nearly double the price. Supplied in 50 patterns — more than 1,000 standard sizes.

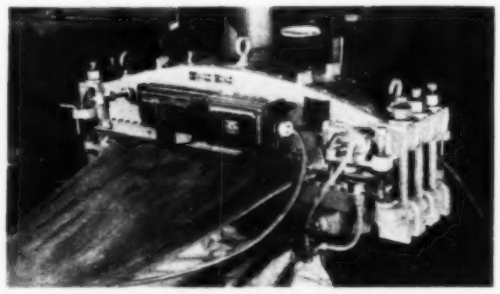
And in addition to Open-end types, Williams manufacture the most complete line of wrenches in the world including Box, Reversible Ratchet, Adjustable, Socket, and Detachable Socket types. If you want the most for your wrench dollar — standardize on Williams. Write for free literature — sold by industrial distributors everywhere.

J. H. WILLIAMS & CO. HEADQUARTERS FOR 225 LAFAYETTE ST., NEW YORK

gears from main camshaft; (3) crankcase cast integral with cylinder block and carries crankshaft support and two main 2-in.-diameter bearings, front one 1¼ in. long, rear one, 1⅜ in. long; (4) engines have L-head cylinders and valves have 30-deg. seats. Provision made for usual accessories, including generator, starter, flange-mounted magneto, battery-type distributor, mechanical governor, fuel pump, fan drive and carburetor. Units said to have numerous industrial, marine, oil field and commercial vehicle applications.—**Hercules Motors Corp., Canton, Ohio.**

★ ★ ★

BELT VULCANIZER for making vulcanized splices and repairs on belting on conveyor has 12-in.-long platen which is wide enough to span 36-in. belt when machine is clamped on belt at 22½-deg. angle. May also be used on 42-in. belt, but it must be placed across belt at 12-deg. angle from line



drawn at right angles to edge of belt. Width of platen, 47 in.; length of platen, 12 in. overall dimensions of machine, width, 54 in.; length, 18 in.; height, 23 in., total weight, 1,145 lb. total wattage, 4,000 lb.; total amperage, 110 v., 36.4, 220 v. 18.2. Electric heating load 4 kw. during heating up period. May be plugged in on any circuit and does not require watching. Adjusting screw permits adjustment to any temperature from 220 to 315 deg. F. If directions are followed, there is said to be no danger of under or over vulcanizing.—**B. F. Goodrich Co., Akron, Ohio.**

★ ★ ★

HYDRAULIC DUMP HOIST for installation on ½-¾- or 1-ton truck chassis is designed for lighter jobs up to 2,000 lb. pay load. Compactness of mechanism said to make possible low mounting, lightweight and loading height under 48 in., desir-

able features for use in hand loading maintenance work. Operating advantages: maximum dumping angle of 60 deg.; cab control; power to raise and lower dump body while truck is in motion; high speed in raising and lowering hoist; minimum sidesway and topheaviness. Hoist is operated by two high pressure hydraulic rams mounted well forward of hinge points in vertical position, affording direct lift to load and eliminating all cramping and much consequent wear and tear on chassis.—**Bird-White Corp., 624 S. Michigan Ave., Chicago, Ill.**

★ ★ ★

TWO NEW HARD FACING COATED ELECTRODES, to be known as "Facewelds Nos. 1 and 12," are cast abrasion resisting alloys used for hard-facing by metallic arc process. Faceweld No. 1 is general purpose electrode said to have high resistance to impact and to be of particular value in surfacing by arc welding such parts as digger teeth, scarifiers, grader blades and cement plant machinery. Faceweld No. 12 is claimed to be somewhat harder than No. 1, to have superior resistance to abrasion, but to have less resistance to impact. Its applications include screw conveyors, conveyor sleeves, plows, gyratory crushers, power shovels and dragline bucket parts, dredge pump impellers and casings, coal pulverizer jaws, cement mill machinery and crusher roll plates. Faceweld, either type, is furnished in ¼-in. size, 12 in. long and comes packed in 5- and 10-lb. containers.—**The Lincoln Electric Co., 12818 Coit Rd., Cleveland, Ohio**

The Job You Want Done Is *Now* Being Done

with CUMMINS Dependable DIESELS

This broad experience . . . *Plus* the Cummins Warranty is your protection when you buy a Cummins Diesel

CUMMINS ENGINE COMPANY • COLUMBUS, INDIANA

Laughlin drop forged Safety Clips *grip* wire rope with a real he-man's clench, not the rope-crimping "finger pinch" you get with ordinary U-Bolt Clips.

Recent tests by one of the country's greatest engineering schools prove that Laughlin Safety Clips are over 50% more efficient!

Write for a free booklet which describes these amazing tests and shows how you profit in lower rope and clip costs by using Laughlin Safety Clips. It's free — use coupon. Mail it now.

SAVE ROPE. When ordinary U-Bolt Clips are removed, bent and crimped rope must be cut off — wasting rope. When Laughlin Safety Clips are removed, rope is straight and strong, ready for use again — no waste of rope.

FEWER CLIPS NEEDED. Here's another big saving. You use only three Laughlin Safety Clips to get the same strength you get with four ordinary U-Bolt Clips.

THE THOMAS LAUGHLIN CO.
Portland, Maine

Please send me free Safety Clip booklet. B4

Name .....

Company .....

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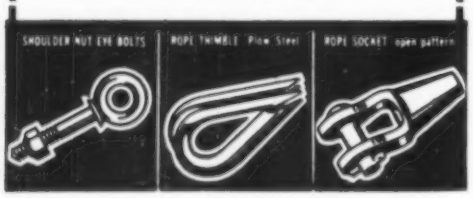
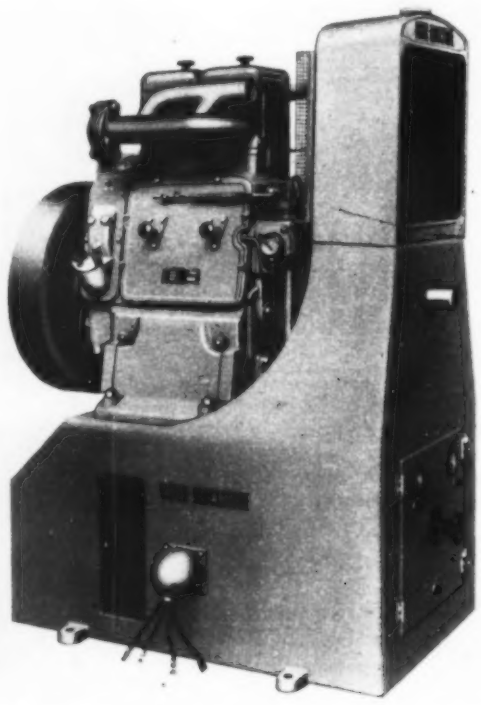
Check here for catalog on items below ☐

Look for Laughlin products in Thomas' Register and buy through your distributor.



DIESEL-ELECTRIC POWER PLANTS, named "Powr-Pak," ranging in size from 3,600 to 24,000 watts, consist of radiator cooled engine, generator and control panel, all assembled in compact form. Chief change from conventional design is said to be in placement of generator which sets directly under-



neath engine and thus cuts floor space requirement almost in half. Generating power supplied by Lister 4-cycle diesel engine using Bosch fuel system. Chromium impregnated cylinder walls. Dual-compression system said to make hand starting easy under all temperature conditions without use of punks, glow plugs or other preheating devices. Available in any desired voltage or current, either d.c. or single- or three-phase a.c. for stationary or marine service. — **Lister-Blackstone, Inc., 1706 South 68th St., Milwaukee, Wis.**

★ ★ ★

BX ARMOR CUTTER, pocket tool for cutting and stripping electric cable in one operation, is said to do job quickly and cleanly without injury to wire insulation; to cut anywhere along cable for opening into outlets, switch boxes and hard-to-get-at-places.

Jaws formed to take BX cable of any type, two or three wires Nos. 12 or 14, without adjustment. Hardened steel cutting blade removable for sharpening. Weight, 12 oz. — **Electrical Products Division, Ideal Commutator Dresser Co., Sycamore, Ill.**

★ ★ ★

STEEL MEASURING TAPES, known as Chrome Face, are chrome plated with chrome-white surface and jet black markings. Said to be unusually free of glare, extra strong, exceptionally well able to resist rust, and to have smooth, hard, easy-to-clean surface. Metal tape claimed not to crack, chip or peel. Two brands available: "Anchor" in ⅜- and ½-

STRENGTH

Just as nature endowed the elephant with amazing strength, so have designing and scientific methods embodied unusual strength in the ABW Solid Shank Shovel.

To say this famous shovel is the strongest shovel made, is no idle claim, for tests have proven its superiority and widespread consumer satisfaction substantiates this claim in performance. Two features are mainly responsible for this unusual strength:

1—The Patented ABW Shock Band, which adds substantially to the handle strength.

2—The blade and socket made from one solid piece of steel.

Add to these features the quality of the steel, the heat treating process, and the Second Growth Northern Ash Handle and it is easily understood why the ABW Solid Shank Shovel is the strongest shovel made. The D Handle Shovel is equipped with the famous ABW Armor-D Handle—the most perfect handle made.

Ask your Jobber

AMES Since 1774

ABW PRODUCTS

Shovels	Rakes
Spades	Post Hole Diggers
Scoops	Agricultural Handles
Forks	
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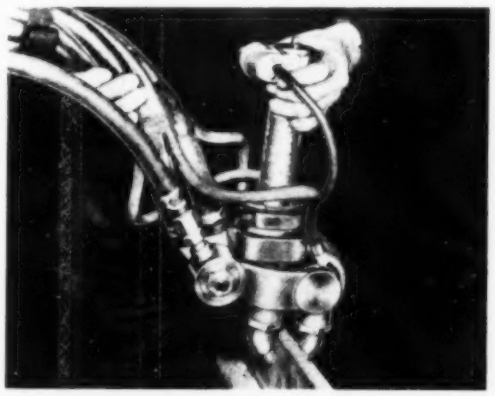
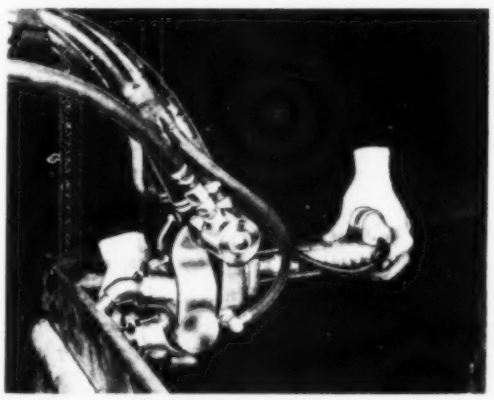
AMES BALDWIN WYOMING CO.
PARKERSBURG, W. VA. • NORTH EASTON, MASS.

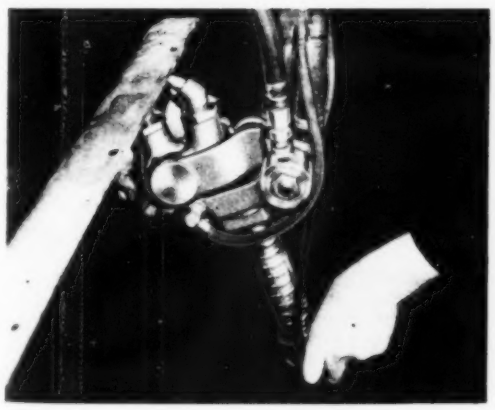
in. widths in genuine leather case, and "Leader," ⅜-in., in imitation leather case. Included in line also are Chrome Face ⅜- and ½-in. wide tapes on metal frames with plumb bob for tank gaging —**The Lufkin Rule Co., Saginaw, Mich.**

★ ★ ★

HYDRAULIC WELDING CABLE CLAMP, for use with All-in-one, No-Kik cable said to increase gun handling speed, to reduce operator fatigue and through its positive clamping action, to provide full current transfer for more uniform welds, is so designed that cable and gun are locked hydraulically while pressure is "on" for weld. When pressure is released, clamp unlocks, permitting gun to be swiveled to different position with little or no movement of cable. Device, which operates directly from hydraulic pressure system, consists of small pressure chamber, plunger of which actuates hollow bolt inserted through both cable and gun terminals (with necessary insulation) and lock nuts on bolts are tightened and locked, when control button is pressed for weld, hydraulic pressure actuates plunger in chamber cable clamp at same time bringing electrodes together on work, thus squeezing each cable terminal into an immovable connection with its respective terminal side of gun, thus providing for full current transfer to weld. Immediately pressure is relieved gun is free to be swung into position for next weld. In this way much cable wear and consequent operator fatigue is said to be eliminated. Made in five different sizes in order to accommodate various types of sliding contact or Pioneer type Progressive guns. Each size has three pressure connections — top of pressure chamber, end of chamber and at bolt end. — **Progressive Welder Co., 3048 East Outer Drive, Detroit, Mich.**







Only BLACKHAWK HYDRAULIC POWER Gives You these Savings on Construction Jobs . . .

SAVE TIME — it means money. Compact Blackhawk Hydraulic Jacks are handier to use — can be positioned and operated faster than cumbersome mechanical types.

SAVE MAN POWER — one man easily lifts full load, frees extra men for other jobs — because Blackhawk Hydraulics deliver 94% operating efficiency, as compared to only 12% to 30% for mechanical jacks.

SAVE TROUBLE — Blackhawk construction assures dependable holding power — no teeth to sheer and suddenly drop load. Positive control to 1/1000 of inch in raising or lowering.

SAVE EXPENSE — Blackhawk Hydraulics pack more power per dollar than any other type — more than pay for themselves on the first big job.

A 4-span 2093-ton bridge was skidded 14 ft. in 12 hrs. with eight 30-ton Blackhawk Hydraulics. Eight mechanicals had done only 13 inches a day previously.

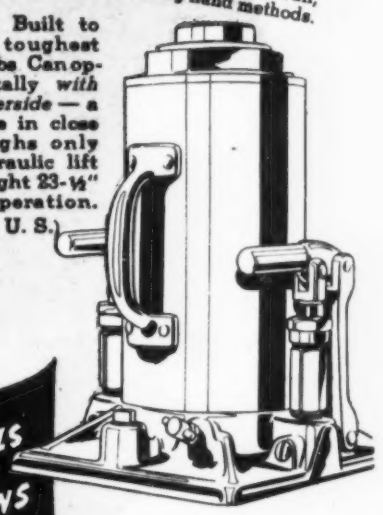
HERE'S HOW

One man operating 75-ton K-18 Blackhawk Hydraulic pushed over this concrete wall, saving days of back-breaking hand methods.

A disabled shovel (with sprung shipper shaft) caused loss of $1250 in 5-hour layoff. 30-ton FA-27 Blackhawk Hydraulic repaired it in a few minutes.

75-ton K-18 Blackhawk Hydraulic jacks sinking caissons to 70-ft. depth.

20-Ton EA-14. Built to "take-it" on toughest construction jobs. Can operate horizontally *with pump on underside* — a great advantage in close quarters. Weighs only 69-½ lbs. — hydraulic lift 9-½", total height 23-½" — one-man operation. $38.00 (East U. S.)



42 MODELS 1 TO 75 TONS

A Product of
BLACKHAWK MFG. CO., *Dept. J2350, Milwaukee, Wis.*

BLACKHAWK
WORLD'S LARGEST MANUFACTURER OF HYDRAULIC JACKS

BLACKHAWK MFG. CO.,
Dept. J2350, Milwaukee, Wis.
Send literature on the hydraulic equipment checked below:
Hand Jacks ☐ Gauge-Equipped Jacks ☐
Porto-Power Remotely Controlled Jacks ☐
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Watch a Haiss at work. See how the weight is placed to give GREATEST digging power. That's why a Haiss digs a bigger pay load...Write or wire for prices. All sizes.
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BALANCED

Equipped with Solid Rubber or Pneumatic Tire Wheels

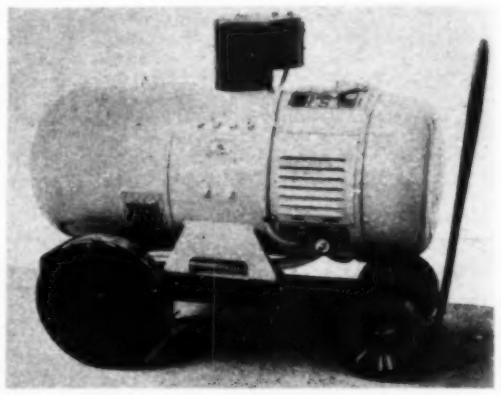
Features:

HARD MAPLE HANDLES
INTER CHANGEABLE PARTS
WELDED TRAYS — NO RIVETS
LARGER TRAY ROD — BUTT WELDED
V-FRONT BRACES — CROSS SUPPORT
CHANNEL STEEL LEGS WITH SHOES

Where tray sheets lap, both sheets are folded around the butt-welded rod in top edge, forming double reinforcements, as shown by the cross-section at the left. This is an extra Sterling value.

STERLING WHEELBARROW CO. MILWAUKEE, WIS.

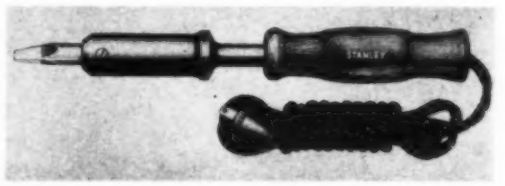
REMOTE CONTROL DEVICE for arc welders may be utilized by removing hand wheel which governs control pole of standard Wilson arc welder and replacing reversible motor-driven unit. Said to cover entire range of machine in both high and low settings, allowing minute adjustments in current output merely by touching one or two contacts on electrode holder to ground. When electrode



holder buttons marked "more" or "less" are grounded, electric motor in remote control housing on top of machine raises or lowers control pole core, increasing or decreasing output. Different shapes of contact buttons enable operator to locate correct one, even in poor light. Electric motor, 1/80 hp., operating control pole, is protected by two limit switches and by slip clutch to prevent damage when end of range is reached. Generator may be preset by push buttons mounted on control itself. — **Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York**

★ ★ ★

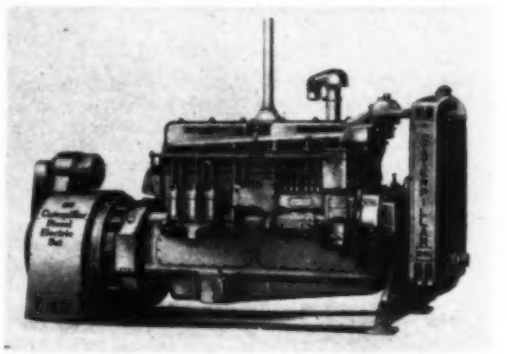
NEW ELECTRIC SOLDERING IRON has plug tip which fits into heating head and is held by screw which permits easy adjustment and removal, as desired. Heating unit is hermetically sealed to prevent corrosion, is wound around hollow core and conducts uniform flow of heat to plug tip. Hard-



wood handles have adjusting sleeve which permits increases in length, if necessary. Plug tips available in two types: copper and armor clad, latter being coated with special metal which protects surface of copper and produces tip said to be free from corrosion and proof against rapid wear. Irons made in four sizes: 105 watts, 3/8-in. tip diameter; 150 watts, 1/2-in. tip diameter; 200 watts, 5/8-in. tip diameter; 350 watts, 7/8-in. tip diameter. Each size available with all copper or armor clad copper tip. —**Stanley Tools, New Britain, Conn.**

★ ★ ★

DIESEL ELECTRIC SETS, 66- and 52-kw. have been added to Caterpillar line in order to supply demand for larger self-contained units of this type. Said to require no gadgets other than circuit breaker and to require minimum of maintenance and adjust-



ments. Each powered by 6-cylinder heavy-duty diesel engine. Started by 2-cylinder, vertical, 4-cycle, 24-hp. gasoline engine with drive by disk clutch and helical gears to flywheel. Electric starting, 32-v., also available. Direct-connected rotating field type self-regulating generator with belt driven

"SMOOTHEST MACHINE I EVER RAN!"

• You'll say the same when you try this new P&H Excavator control!

Here, you get none of that jerking and slamming . . . *this* machine responds *smoothly* to every move on the crowd, hoist, swing and travel — yet it's faster than you'll ever want to run it.

That's because this control gives you direct "feel" of the load at all times. It's as simple and easy to operate as a modern car. No other excavator has ever equaled its smooth, quick response.

You'll spend less time in servicing — less money in repair bills, too. For example, one user recently reported 1500 hours without even a brake adjustment. This machine gives you full floating brakes, automotive type clutches, and many other proved advantages.

Before you buy an excavator, try this new P&H control.

P&H EXCAVATORS

This remarkable new control is available on P&H ¾, ½, ⅜ and 1½ yard excavators. For complete information on it, ask us to send you Bulletin X-60.

P&H Excavators are built in 18 different sizes, from ⅜ to 5 cubic yards capacity — gasoline, Diesel, or electric power. Literature is available on all models.

General Offices: 4494 W. National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

CLYDE... WHIRLEYS

Two of the three Clyde Whirleys recently installed at the plant of the Seattle-Tacoma Shipbuilding Corp.

Building ships, dams, bridges or locks . . . all in the day's work for Clyde Whirleys!

High speed construction programs are right in line for the fast, efficient and flexible performance of these modern and superior machines.

Long reaching booms of alloy metals permit heavier loads at greater radius. Husky self-aligning center pin eliminate binding and results in smooth swinging and longer life. Equalizing carriages insure against individual wheel overloading. Rigid construction throughout provides for safety and dependability.

Write for Bulletin K-12

CLYDE

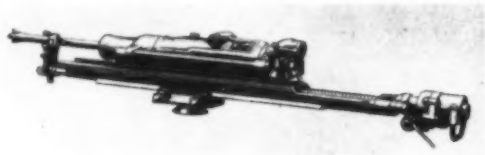
CLYDE IRON WORKS, Inc.

DULUTH—MINN.

exciter mounted thereon. Rotor carried by ball bearings and driven with rubber drive link coupling. Alternating current voltages, 3- and 1-phases, 110, 220 and 440.—**Caterpillar Tractor Co., Peoria, Ill.**

★ ★ ★

DRIFTER ROCK DRILL for heavy-duty drifting in mining and large tunnels when used with 1¼ and 1½-in. round lugged steels is said to produce remarkable drilling speed in hardest formations. Constant blowing action keeps hole clean, and for final hole cleaning manually operated valve is easily accessible for extra blowing power. Features: (1) Positive, short-travel valve which controls air, allow-



ing proper amount for maximum efficiency; (2) automatic lubrication; (3) "Power feed" powered by independently balanced rotary air motor mounted rigidly on rear end of guide shell, power being transmitted through planetary gearing from motor directly to feed screw. Perfect alignment of rotor with screw is accomplished by splined driving unit so that shock on feed screw is not transmitted to motor mechanism, but is absorbed by shell. Coil springs mounted at each end of shell prevent shock when drifter is in extreme forward or rear position. Feed is controlled by one handle instead of usual two handles for throttle and brake which is said to make operation of drill easier and faster, particularly in ravelly formations. Also provided is speed control which regulates speed of machine according to hardness of formation.—**Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.**

★ ★ ★

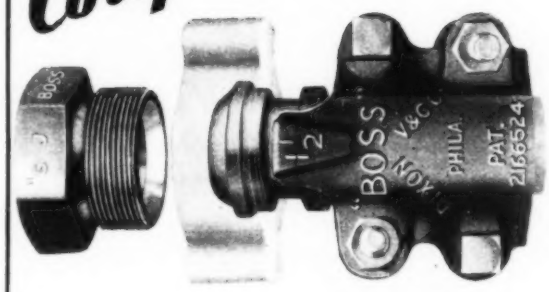
PNEUMATIC SPADER appears in new model embodying improvements that include hand-fitting handle of tough nickel alloy steel drop forging, ex-

haust parts placed at angle to deflect waste air downward, "four-way" protection of alignment between handle and cylinder by extra strong joint connection, spool type valve with large bearing surfaces, air cushion in end of cylinder to reduce jar and special heat-treated steel retainer on rubber bushing to resist wear from spade. Spader, designed especially for shaft sinking, tunnel and trench work in clay, broken shale and hardpan, weighs 25 lb.; is 19½ in. long, without spade, and has cylinder bore of 1½ in. Standard size of shank for spader is ¾ in. square and 2¾ in. long. —**Sullivan Machinery Co., Michigan City, Ind.**

★ ★ ★

HIGH-SPEED CONCRETE VIBRATOR 2⅛x14 in., geared to deliver 6,000 v.p.m. is said to be constructed of toughest materials to withstand abrasive action that takes place during operation. Tip welded with special metals to give maximum hours of performance. Universal type motor furnished for operation on 110-v. a.c. or d.c., 25-, 50-, or 60- cycle, and equipped with switch built-in handle, 25-ft. two-

You Can Depend on the "BOSS" to Cut Your Hose and Coupling Costs!



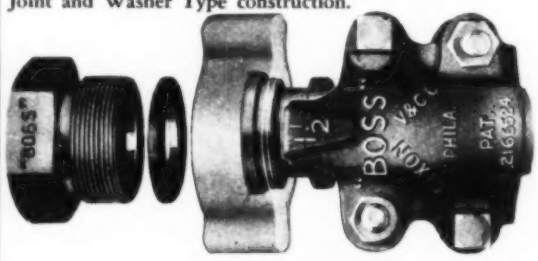
"GJ-BOSS"

GROUND JOINT, STYLE X-34

HOSE COUPLINGS

Safety, efficiency and long life . . . resulting in important savings in maintenance and replacement costs . . . are proven advantages of these *washerless,* leakproof couplings. Copper insert in spud fits accurately rounded head of steel stem, forming soft-to-hard metal seal that *will not leak,* regardless of wear. No service interruptions to replace worn-out washers. No possibility of blow-offs because of powerful grip of sturdy 4-bolt "BOSS" Offset Clamp (on sizes 1" and larger; 2-bolt clamp on ⅞" and smaller). Cadmium plated-rustproof.

NOTE: In illustrations above and below, Wing Nuts are shown in "phantom", to reveal difference between Ground Joint and Washer Type construction.



"BOSS" WASHER TYPE STYLE W-16

HOSE COUPLINGS

Same as above, except that head of steel stem is flat flange to accommodate washer. All parts steel or malleable iron, cadmium plated. Sizes: ½" to 4" inclusive, with 4-bolt "BOSS" Offset Clamp on 1" and larger; 2-bolt clamp on ⅞" and smaller.

Stocked by leading Rubber Manufacturers and Jobbers. Write for Descriptive Folder.

DIXON

VALVE & COUPLING CO.

MAIN OFFICE AND FACTORY

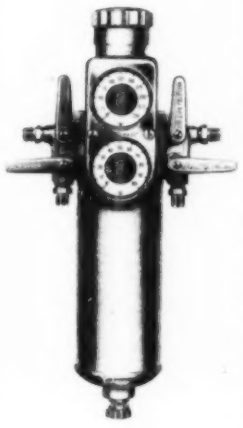
PHILADELPHIA

Chicago • Birmingham • Los Angeles • Houston

conductor cord and plug. Geared down to delivery, 6,000 r.p.m. Short coupled 7/16-in.-diameter flexible shaft and housing 18 in. long between motor and vibrator. Two units may be operated from 1½-kw. generator on finishing machine. Overall length 43 in.; weight, 27 lb. — **Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill.**

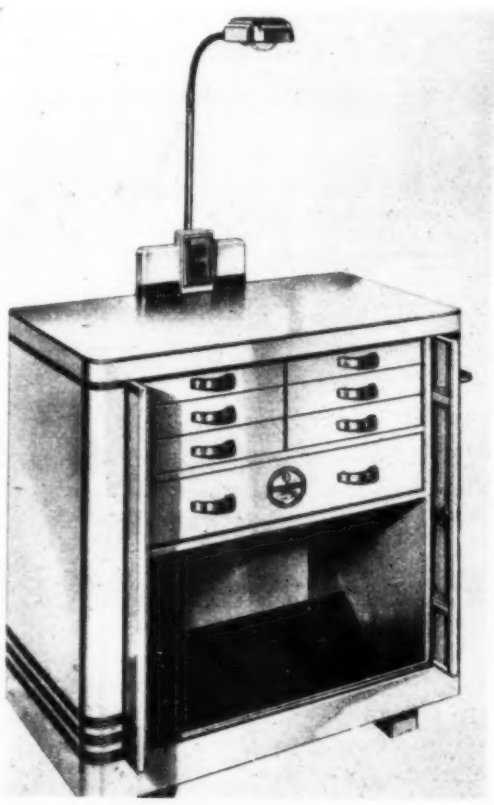
★ ★ ★

STREAMLINED AIR TRANSFORMER said to feed spray gun clean, moisture-free air at uniform regulated pressure. Features: Greatly increased capacity; improved filtering facilities; large, synthetic rubber regulator diaphragm, refined operating mechanism and conveniently located regulator knob assuring more sensitive regulation and control of pressure. Claimed to handle in excess of 50 cu.ft. of air per minute with minimum of pressure drop, and to pass enough air for two production spray guns in continuous and simultaneous operation or for three guns in ordinary intermittent production use. Other improvements: (1) Extra large condensing chamber said to offer greater air expansion and more thorough condensation of moisture; (2) improved baffle arrangement for further effectiveness in air cleansing; (3) mechanical filtering device to give continuous filtering efficiency without wear or attention; (4) metal filter eliminates usual cotton waste pack and necessity for repeated removal and replacement; (5) inclosed pressure gages with modern-type dial; (6) chromium plated, highly polished cylinder. —**The De Vilbiss Co., Toledo, Ohio.**



★ ★ ★

MECHANICS' WRENCH SETS in two assortments, 100DD containing 87 and 35B containing 34 units of Nugget socket and box types, as well as other essential tools, are being offered on a trade-in basis, with credits of $25 for 40 old wrenches turned in on larger set and $5 for 25 old wrenches on smaller set. 7/16-in. drive wrenches in both sets, it is claimed, eliminate duplication between ⅜ and ½-in. square drive series. Use of Hexite steel, stronger than chrome-vanadium, reduces weight and bulk of wrenches. New wrench developments



WORK BENCH for 87-unit wrench set.

BAKERS TAKE JOBS AS THEY COME

HYDRAULIC

Bulldozers

Owners of Baker Hydraulic Bulldozers and Gradebuilders have the satisfaction of knowing they are equipped to handle practically any kind of jobs, no matter how tough they may be. Bakers never fail to live up to their reputation for sturdiness, accurate performance and easy control. That's why you'll find them favorites for work requiring greater strength and unusual performance.

With the two types of Baker Bulldozers — with straight and curved blades — you can do a wider variety of work. Bulldozer moldboards are interchangeable with each other as well as with Gradebuilder moldboards.

Remember Baker builds only twin-cylinder, direct-lift Bulldozers and Gradebuilders with down pressure and balanced hydraulic system — the kind with simple, secure mounting that is easy on your tractors.

HYDRAULIC

Scrapers

The "flat digging angle" feature of Baker Two-Wheel Scrapers is more than theory. Users everywhere report Bakers load easier, with less power... cut smoother, more even grades... reduce earth moving costs by increased yardage.

Baker Scrapers are now built in three practical sizes — 3, 4 and 6 cubic yard capacities for tractors of 25 to 60 H.P. All have automatic rear clearance which makes flat digging not only practical but outstanding in results.

Below: Capacity loads like this are the reason Bakers Scrapers pay big returns.

Ask for Bulletins on Bulldozers, Scrapers or any item of Baker Tractor Equipment.

THE BAKER MFG. CO., 568 Stanford Ave., Springfield, Ill.

• BAKER TRACTOR EQUIPMENT •

BULLDOZERS • GRADEBUILDERS • SCRAPERS • ROOTERS • ROAD DISCS • MAINTAINERS • SNOW PLOWS

JOBS DON'T COME TOUGHER THAN THIS ONE!

• This Williams ½ Yard Multiple Rope Bucket took plenty of punishment on this job—tearing out the massive stone and concrete foundations of the old Baldwin Locomotive Works in Philadelphia. Wm. Geppert, Inc. are the contractors.

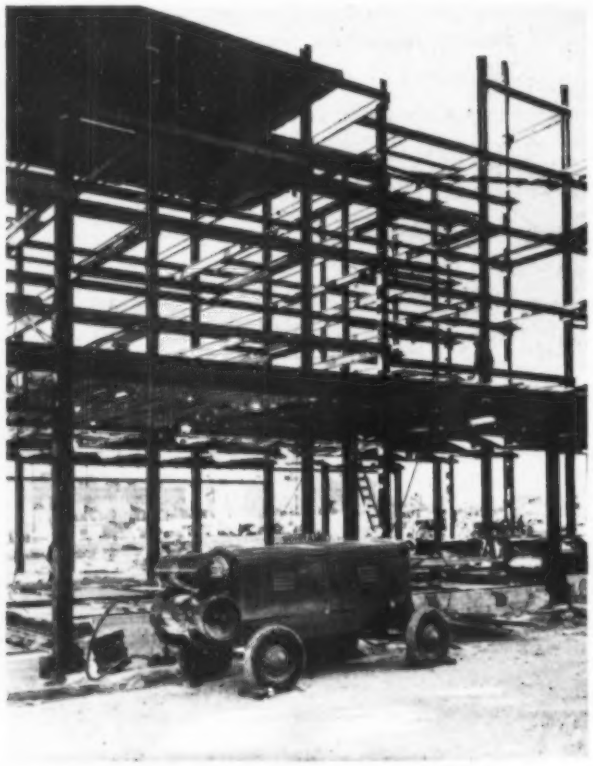
.The digging power in Williams design and the rugged durability of their welded rolled steel construction make Williams Buckets profit producers for contractors everywhere.

Bulletins describing all types of Williams Buckets sent FREE on request.

THE WELLMAN ENGINEERING CO.
7017 CENTRAL AVE., CLEVELAND, OHIO

WILLIAMS *Buckets*
***built by* WELLMAN**

SCHRAMM AIR COMPRESSORS



THE CHOICE OF THE STEEL ERECTOR ON THE METROPOLITAN HOUSING PROJECT IN THE BRONX, NEW YORK (THE LARGEST HOUSING PROJECT IN THE WORLD)

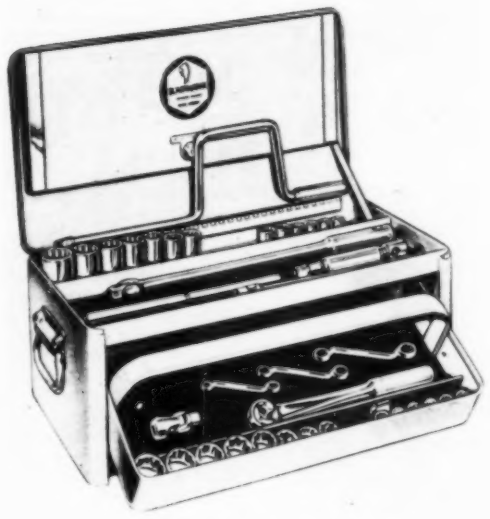
SIZES 40 TO 420 C.F.M.

GASOLINE ENGINE
DIESEL ENGINE
ELECTRIC MOTOR
} DRIVE

ELECTRIC STARTER
BUILT IN ON ALL MODELS

SCHRAMM, Inc. • **902 E. VIRGINIA AVE. WEST CHESTER, PA.**

Established 1900



TOOL CHEST for 34-unit wrench set.

include a non-slipping two-length ratchet type, ¼-in. drive sockets and handles and box types. Safety feature is embodied in "Lock-On" device in sockets and wrench handles. Spring-backed plunger, with thumb release, in handle drive prevents sockets from slipping off and falling. 35B set is supplied in steel chest with pull-out tray and compartments, while 100DD set is contained in large portable work bench with drawers, electric light fixtures, disappearing doors and steel work top reinforced for mounting of vise.—**Blackhawk Mf'g. Co., Milwaukee, Wis.**

★ ★ ★

NEW TYPE OF COPPER, known as "PDCP," has been developed to meet need of electrical industry for metal of superior characteristics. Greater conducting power, ductility, fatigue resistance and surface quality are said to be outstanding features of this new metal made without melting from electrolytic cathode copper plastically converted by tremendous pressure in reducing atmosphere at elevated temperature into smooth, dense copper bar, rod, strip or other desired commercial shape. Of particular interest to engineers and maintenance men concerned with copper windings in motors and transformers which, due to vibration and magnetic stress, often develop surface weaknesses penetrating insulation and causing short circuits. Exceptional ductility said to permit sharper bends, easier forming and drawing, and to approach malleability of gold.—**Phelps Dodge Copper Products Corp., 40 Wall St., New York City.**

★ ★ ★

SPRAY LINE MARKER, complete self-contained portable spray unit for marking of traffic lines for highways, city streets, warehouses, airports, steel mills, large factories and wherever else traffic lines are

in use. Said to be ideal for one-man operation and to lay down stripe from 2 to 6 in. in width at rate of from 1 to 4 m.p.h., depending upon condition of pavement or floor. Equipped with ¾-hp. gasoline engine and four pneumatic tires. Material supplied by 12-gal. material pressure container.—**Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill.**

EFFICIENCY INCREASED FOR CONTRACTOR 21.5%!

● THOROUGH inspection and skilled adjustment on all units resulted in an over-all increase in efficiency of 21.5% in the fleet of William Lathers, Jr., Wisconsin contractor. W. H. McConighen, the Standard Oil Automotive Engineer shown at work in this picture, is the man who conducted the necessary tests and made the recommendations on this particular job.

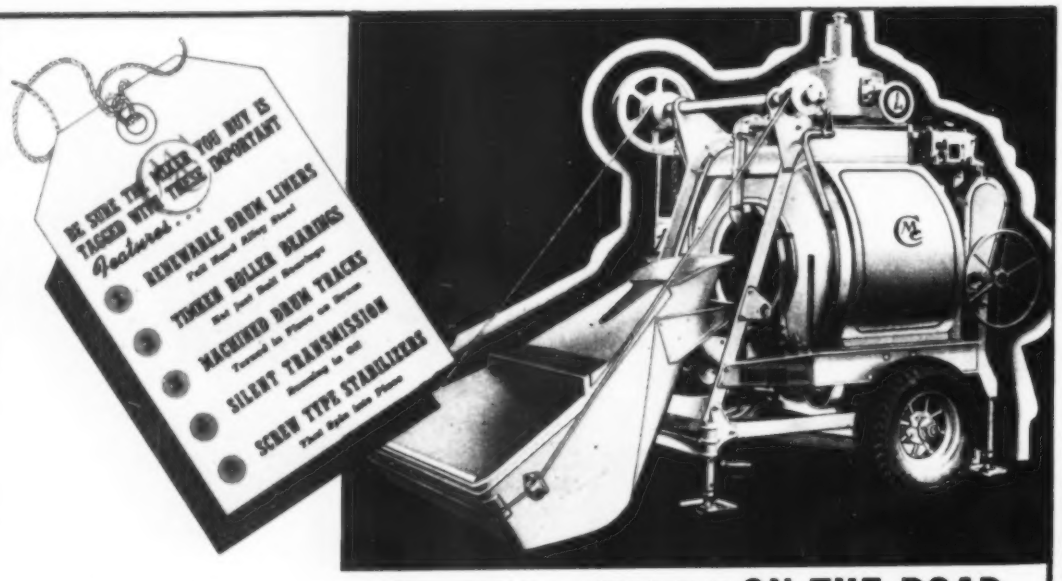
If you are situated anywhere in the Middle West there are Standard Oil Automotive Engineers ready and anxious to serve you in the same way. This complete combustion engineering check-up—often a real money-saver—is absolutely *free* to fleet operators using Standard Oil products.

Reach these engineers through your local Standard Oil (Indiana) office or by writing 910 S. Michigan Avenue, Chicago, Illinois.

Copr. 1940, Standard Oil Co. (Ind.)

STANDARD OIL COMPANY (INDIANA

AUTOMOTIVE ENGINEERING SERVICE LOWERS MILEAGE COSTS


BE SURE THE MIXER YOU BUY IS TAGGED WITH THESE IMPORTANT Features...
RENEWABLE DRUM LINERS
TIMKEN ROLLER BEARINGS
MACHINED DRUM TRACKS
SILENT TRANSMISSION
SCREW TYPE STABILIZERS

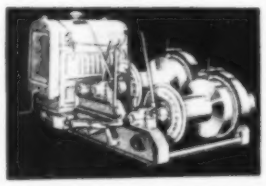
ONLY CMC OFFERS ALL THESE MODERN MIXER FEATURES!

Speed ON THE ROAD ON THE JOB!

You get big output with greatest portability in these trim, compact CMC two wheelers. Available in 5S, 7S, 10S, 14S sizes. Also four wheelers up to 14S — End Discharge and Side Discharge Models. A COMPLETE CHOICE to fit your needs, means time saved and extra profits.

LEFT—CMC bin batcher takes the advantages of a central mixing plant to every job at unbelievably low cost.

RIGHT — New CMC Hoists. Low priced — high quality. Up to 40 H.P. Single and double drum.

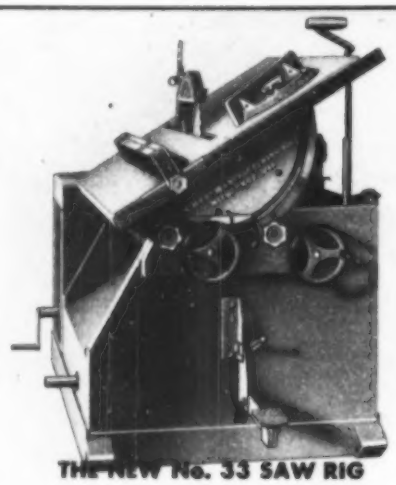


Write TODAY for latest CMC catalog showing newest in Concrete, Plaster, Mortar and Bituminous Mixers, Pumps, Power Saws, Hoisting and Placing Equipment, Carts and Barrows.

CONSTRUCTION MACHINERY CO., Waterloo, Iowa

C.H.&E.

PORTABLE SAW RIGS



THE NEW No. 33 SAW RIG

• Tilting Table • Swing Arbor — Straight Line • All Welded Construction • Ball and Roller Bearings • V Belt Drive • Six Models • Ripping Capacities to 7" Lumber • Band Saw, — Jointer and Borer Attachments

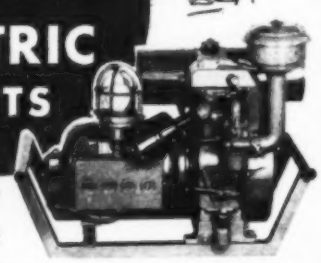
Send for Bulletin SR-38

A COMPLETE LINE OF PUMPS—HOISTS—MORTAR MIXERS—SMALL ROLLERS—BAR CUTTERS & BENDERS

C. H. & E. MANUFACTURING CO.
3847 N. Palmer St., Milwaukee, Wis.

"U.S." ELECTRIC PLANTS

For Construction Work



1250 WATT PORTABLE

A made-to-order plant for construction work. Two sizes: 1250 watts and 2500 watts. For operating tools or flood lighting. Lightweight, compact, and equipped with carriers for easy portability. Air-cooled, 4 cycle, quick starting. 2 gal. fuel tank. Ruggedly built for hard usage.

WORLD'S MOST COMPLETE LINE

We are builders of the world's most complete line of Electric Plants. In all parts of the world, U.S. plants have proved their steadfast dependability. And the reason: "U.S." generating sets are designed to meet the conditions under which they will operate.

LARGER SIZES

Larger sizes are available. Illustration to the right is 5KW, 4 cylinder portable unit mounted on trailer with weather-proof hood. U. S. line includes models up to 75 KW, AC, DC, all types of controls and voltages. Write for complete information.

DIESELS

For continuous, heavy-duty service at low cost, U.S. Diesel Electric Plants offer a complete range of sizes from 3 KW to 75 KW—1, 2, 4 and 6 cylinder models.

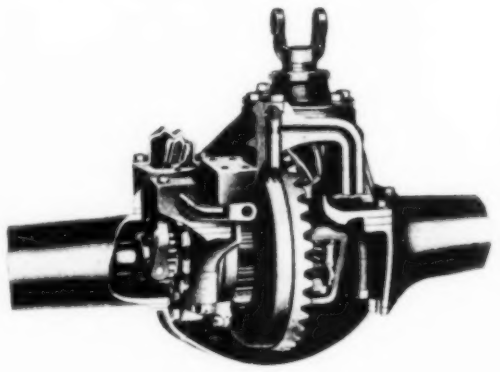
UNITED STATES MOTORS CORP.
431 Nebraska St., Oshkosh, Wis.

PORTABLE ELECTRIC HAND-SAW, new model, has 12-in. blade with free speed of 2,400 r.p.m. and cuts to depth of 4⅜ in. Said to be ideal for mine construction and for all timber cutting on docks, dam superstructures, bridges, and railroad maintenance of-way jobs; to be practical for cutting many types of building tile and for continuous cutting of copper

sheets up to ⅝ in. thick, lead sheets up to 2 in. thick and many types of heavy-gage corrugated metals. Said to rip and crosscut timbers up to 4 in. full, and to bevel-cut lumber 3 5/16 in. thick at 45 deg. Blade protected by automatic spring-operated telescoping guard that rotates on ball bearings. Length, 22 in.; die-cast aluminum alloy frame; all shafts mounted on ball bearings; blower arrangement built into upper guard keeps line of cut free of sawdust.—**Skilsaw Inc., 3310 Ellston Ave., Chicago, Ill.**

★ ★ ★

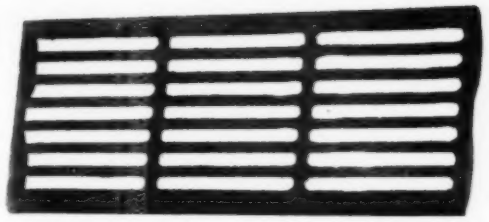
TWO-SPEED DUAL PERFORMANCE AXLES used in Dodge Dual-Purpose truck models permit instant change from low to high speed as required by road and load conditions. Said to afford their users important advantages, chief among them operating



economy, flexibility, higher speed and reduced engine wear resulting in lower maintenance cost. Uses for this type truck: excavation work where power is needed for pulling out heavy loads and returning light; in hilly cities; inter-city hauls through country partly hilly and partly flat; any operation where diminishing load or light return trip at higher speed is desirable.—**Dodge Division, Chrysler Corp., Detroit, Mich.**

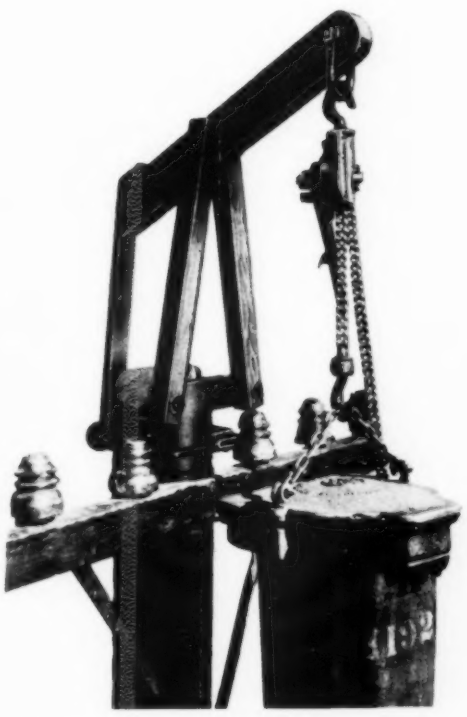
★ ★ ★

NON-SLIP ABRASIVE SAFETY METAL, named Hy-Tenso X, and said to combine strength and light weight qualities of steel with highly non-corrosive properties of gray iron, is available in form of stair treads, gas and oil storage tank treads, floor plate and for sundry other units. Has tensile strength of 50,000 lb. and yield point of 35,000 lb. per square

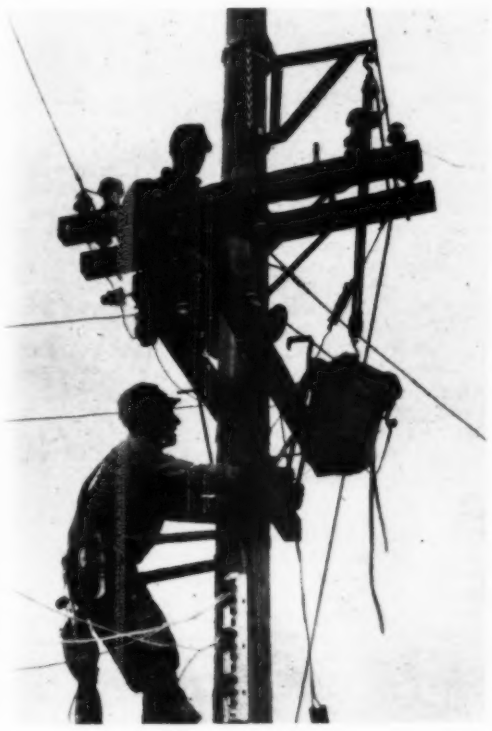


inch. Because of this physical characteristic, it is possible to construct these different products with lighter cross-section, thereby reducing weight and increasing shock, corrosion and wear resistance.—**Eastern Malleable Iron Co., Wilmington, Del.**

★ ★ ★



TWO NEW TRANSFORMER GINS are now in use in electric power line construction and maintenance. Gin shown above is non-conductor of electricity and may easily be clamped on top of pole for lifting transformers, load pots and lead cables. Gin below clamps on side of pole and is more desirable for some jobs than pole top gin. These gins fit any size pole and have been tested to more than 3,000 lb. without showing signs of yielding, manufacturers claim. — **The Coffing Hoist Co., Danville, Ill.**



When Minutes mean Dollars— and even Lives!

A FLOOD TO STEM!

Action is imperative — mobility is essential — and it's a MICHIGAN that meets another emergency, as described in this unsolicited letter to a dealer.

COUNTY OF YOLO
Woodland, California

March 7, 1940.

Spears Wells Machinery Co.
1832 West Ninth Street
Oakland, California

Dear Sir: Attn: Mr. George Sievers

During the recent flood conditions in Yolo County your Michigan Truck Shovel played a very important part in protecting the town of Knights Landing from flood waters of the Sacramento River.

On the evening of February 29th the water reached the level of the Levee and it was necessary to sack the levee for about 1000 feet. At this time the only means of loading and hauling dirt was by use of hand shovels - our Michigan Shovel being 28 miles away. At 12:00 O'clock mid-night we called Mr. McCoy, foreman in Road District 2 to bring the shovel to Knights Landing immediately. It was necessary for Mr. McCoy to get his operator and drive 10 miles to the point where the shovel was located.

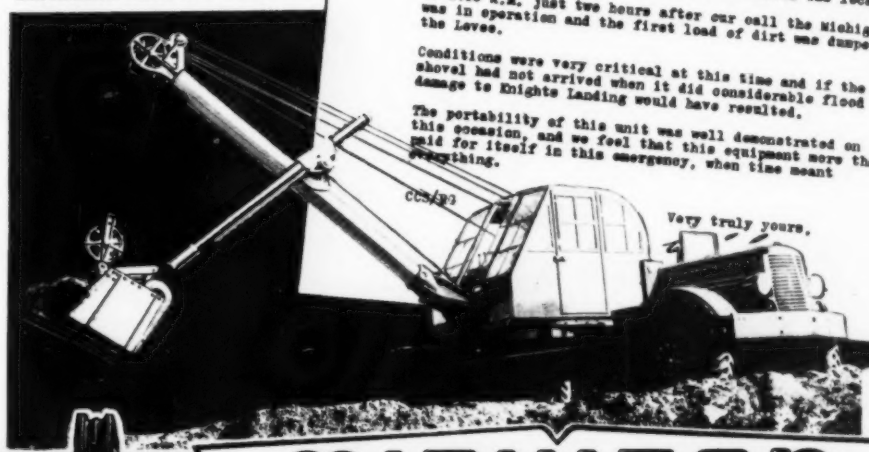
At 2:00 A.M. just two hours after our call the Michigan was in operation and the first load of dirt was dumped on the Levee.

Conditions were very critical at this time and if the shovel had not arrived when it did considerable flood damage to Knights Landing would have resulted.

The portability of this unit was well demonstrated on this occasion, and we feel that this equipment more than paid for itself in this emergency, when time meant everything.

CCS/RJ

Very truly yours,



MICHIGAN
AIR CONTROLS

SAVING DOLLARS

and time is an every day accomplishment for this modern Truck Shovel-Crane — and there's plenty of "plus-performance" always ready for the pinches! Get the full facts and figures — write today for WORK BOOK CM-50.

America's Truck Shovel Specialists

MICHIGAN POWER SHOVEL Co
Benton Harbor, Michigan, U.S.A.

THE RIGHT JACK

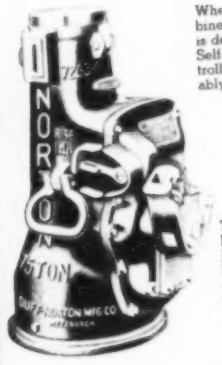
Saves TIME

Saves LABOR

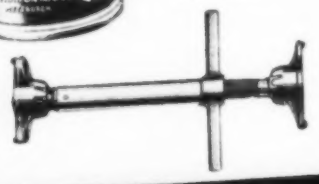
Speeds CONSTRUCTION

A Few of the more than 300 Sizes and Types of Duff-Norton Jacks

Ideal for low loads in cramped quarters, as well as normal loads, this Automatic Lowering Jack finds many construction applications. Sizes, 5 to 20 tons.



Where great power combined with ease of operation is desired, the Duff-Norton Self-Lowering, Speed-Controlled Jacks serve dependably and efficiently.



Trench Braces, Push and Pull Jacks, Pipe Forcing Jacks are other Duff-Norton items used by construction engineers to save time and money.

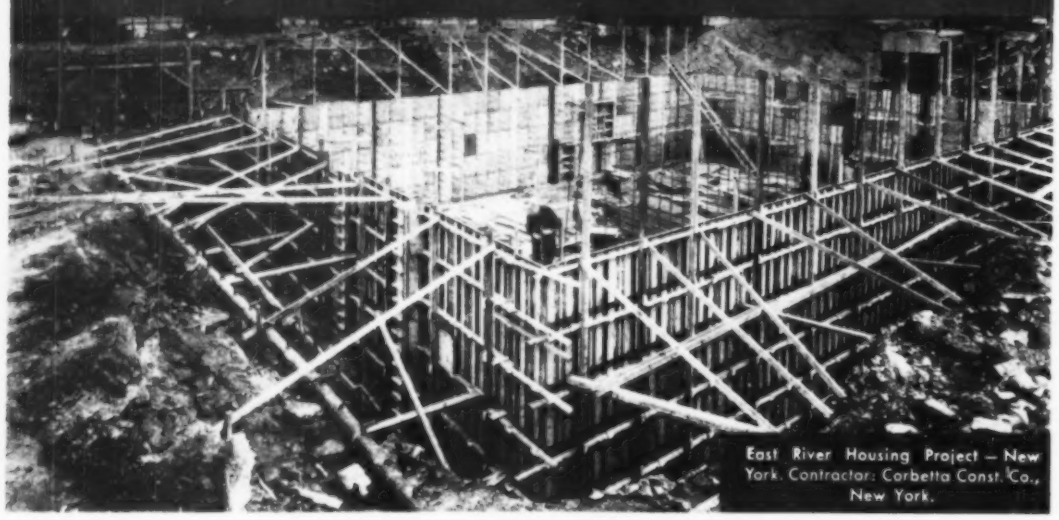
Your work goes faster when you have the RIGHT Jacks at hand. From the more than 300 different Duff-Norton styles and sizes you can select jacks especially suited for each class of lifting, lowering and holding jobs you encounter. A Duff-Norton specialist will help you pick the ones you should have for speed and economy of construction.

THE DUFF-NORTON MANUFACTURING COMPANY · PITTSBURGH, PA.

"The House that Jacks Built"

Moretrench agrees:

"TO SUCCESSFULLY PREDRAIN"



East River Housing Project — New York. Contractor: Corbetta Const. Co., New York.

That phrase to any contractor means: A DRY JOB — IN SHORT ORDER — AT LOW COST.

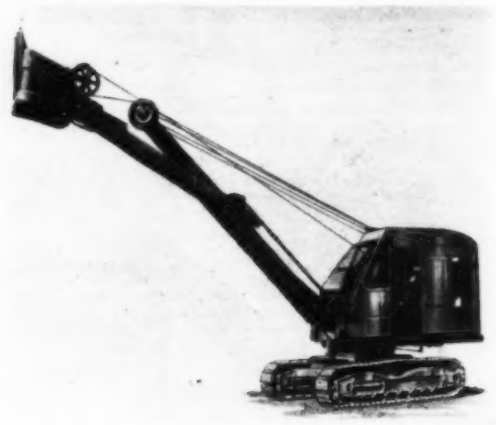
• To get results on your wet job, install a MORETRENCH WELLPOINT SYSTEM *first!*

MORETRENCH CORPORATION

90 WEST STREET, NEW YORK CITY

BRANCH WAREHOUSES: JOLIET, ILL.; NEW ORLEANS, LA. • PLANT: ROCKAWAY, N. J.

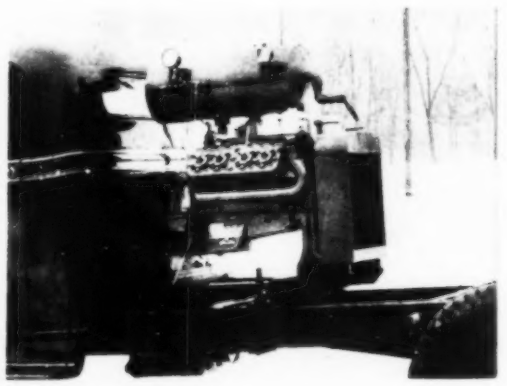
½-YD. CONVERTIBLE SHOVEL-DRAGLINE-CRANE has following improvements: self-aligning roller bearings on drum, reverse and main power shafts, safety-type rapid boom hoist for crane duty with conventional worm-geared boom hoist optional; fully inclosed traction gears running in oil; double fully inclosed traction brakes controlled from cab, 56-in. machine finished roller path turntable with



roller bearing "hook" rollers, interchangeable clutches on drum swing, retract and boom hoist; welded steel design; glassed-in operator's cab. Powered by 60-hp. gasoline or diesel engine. Lug-driven-type track shoes, 16 in. standard, 20 and 24 in. optional. Tractor-type crawler 16 in. standard, 18 in. optional, may be had. Both types of crawlers, smooth and non-clogging, and provided with recoil springs. Said to be quickly convertible without mechanical alteration. Two travel speeds to increase mobility. Simple, positive steering and ample ground clearance.—**Link-Belt Speeder Corp., 301 W. Pershing Road, Chicago, Ill.**

★ ★ ★

POWER TAKEOFF COMPRESSOR-TRUCK COMBINATION, for use with Ford and any other standard truck which can be fitted with split shaft power takeoff, is recommended for use of utility companies, municipalities, painters, contractors and others who



have need for this type unit. Compressor is 8-cylinder, V block with special cylinder heads, camshaft and manifolds. Overhead tank mounting to conserve space. Cooling system so designed that cab may be built around unit without impairing operation. Automatic controls. Because most parts are of standard Ford manufacture, service said to present no problem.—**Schramm, Inc., West Chester, Pa.**

★ ★ ★

SHORT-COUPLED MEDIUM WEIGHT, ALL-WHEEL-DRIVE TRUCK for semi-trailer service in highway trucking and for general construction and excavation jobs, has been made available by converting standard Ford V-8, 101-in. wheelbase, cab-over-engine model to all-wheel-drive. Advantages: (1) Maneuverability; (2) short wheelbase provides short turning radius; (3) all-wheel-drive traction and power for climbing steep hills and grades and for adequate performance in soft and slippery ground; (4) normal front wheel placement gives greater approach angle for getting in and out of ditches; (5) cab-over-engine design said to permit better load balancing, more uniform traction and less tire wear. Equipped with constant velocity joint steering ends which provide finger-tip steering control under all conditions.—**Marmon-Herrington Co., Inc., Indianapolis, Ind.**

Spotting water Mains without manual aid is proof of Marion's fraction-of-an-inch control

The Marion 352 loads trucks as rapidly as they can haul the loads away

Marion 352 — 2 cu. yd. Pull-shovel lowers a 6½ ton, 16′ x 42″ pipe into trench

All of Grand Rapids will depend upon the Marion-built pipe line for its water supply

(AT TOP)—One of the Marions digging the 32 mile trench

3 MARION PULL-SHOVELS TRENCH and LAY 32 MILES of PIPE LINE

Marion's proven ability to handle unusual jobs is well illustrated on the Grand Rapids Water Works Improvement Project. Here, three Marions are saving time and money for Price Brothers Co., Dayton, Ohio, contractors on the job, digging a trench from Lake Michigan to Grand Rapids, a distance of 32 miles . . . and placing 6½ tons of lock-joint concrete and steel pipe . . . an average of 560 feet day . . . through which the new water suppl ll be carried. ● Marion's adaptability to all types of construction work assures profits on low bids.

THE MARION STEAM SHOVEL CO.
MARION, OHIO, U. S. A.

MODERNIZE with

MARION

SHOVELS • DRAGLINES • CLAMSHELLS
CRANES • PULL-SHOVELS • WALKERS

from 3/4 cu. yd. to 35 cu. yds.
Gasoline • Diesel • Electric

Bigger AND fewer SHOTS

Giant blasts are saving money for quarry and open pit operators — in time, in labor, in the moving of equipment. 10 holes — even 4000 holes! — are all in the day's work for PRIMACORD-BICKFORD Detonating Fuse. There's no limit to the depth of the holes or the intricacy of the hookup.

The powerful detonating wave travels Primacord at more than 3 miles per second. It reaches every cartridge in the column, exploding it directly. Primacord detonates the entire blast practically instantaneously, but the split-second time delay between holes and rows, provides the necessary relief of burden.

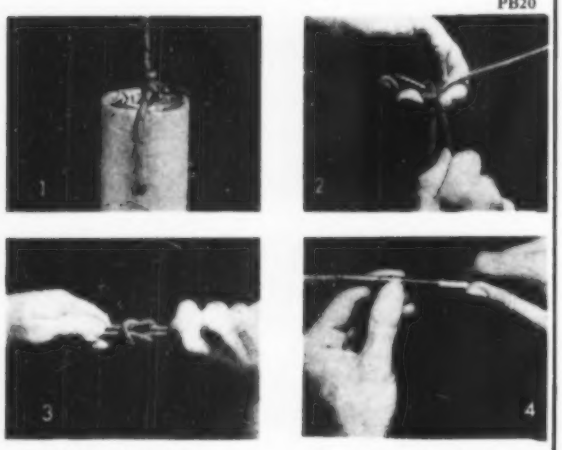
The giant blast with Primacord permits you to keep equipment on the job until all drilling and loading is finished. *That* alone saves considerable time and money.

THE ENSIGN-BICKFORD CO.
Simsbury, Conn.

Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse since 1836

PRIMACORD-BICKFORD *Detonating* FUSE

PB20



1. Tie through cartridge.
2. Half hitch branch to main line.
3. Connect main line lengths with square knot.
4. Fuse and cap on end of main line.

Delaware Aqueduct

(Continued from page 47)

aqueduct system noted on the adjoining map. The completed system will add 540 million gallons a day to the supply of New York City, augmenting the present supply by 50 per cent. For the entire system, an estimated expenditure of $298,000,000 is contemplated. At present, $160,000,000 worth of work is under contract, making the aqueduct the largest going project in the nation. Water is expected to start flowing from Rondout reservoir through the 85-mi. tunnel in 1944. The link to Neversink reservoir will be opened soon thereafter, and the remainder of the system will be completed at a later date.

Both in length of tunnel and in total cost, the aqueduct system surpasses any previous project of the kind. A 45-mi. pressure tunnel from Rondout reservoir to the existing West Branch reservoir in the Croton system is the longest underground bore in the world. With city tunnel No. 2, completed in 1936 to serve the distribution end of the system, the aqueduct will have a total length of 105 mi. in deep rock tunnel.

31 Shafts

Of the 31 shafts shown on the attached profile of the 85-mi. tunnel, twenty-three are for access, operation and control after the aqueduct goes into service. The remaining eight are for tunnel construction only; these shafts will be sealed at the top and bottom after construction is completed. An accompanying tabulation of aqueduct contracts notes four shaft contracts under which three firms sank 23 shafts prior to the start of tunneling by subsequent contractors. Shaft 1, the intake shaft, and shafts 11 to 16, inclusive, are included in present contracts.

To eliminate danger of rock falls, all shafts are lined from top to bottom with 19½-in. minimum average thickness concrete, and ten service pipes from 6 in. to 1 in. diameter, for all tunnel construction services except ventilation, are incased in the lining. With two exceptions, the shafts are circular, varying from 14 ft. to 26½ ft. in finished diameter. Two of the drainage shafts, shaft 13 and shaft 23, have elliptical sections measuring 23x26 and 22x32 ft. on the principal axes.

As indicated by the profile, the shafts at five locations are double shafts, close together but entirely separate. From these shafts, as well as from the intake and discharge shafts of the 85-mi. aqueduct, headings normally can be driven only in one direction. An exception occurs at shaft 9, where the contractor at his own expense drove a drift connecting the two tunnels to permit working both ways from the downtake shaft. Tunnel contracts are so

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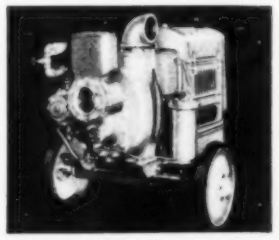

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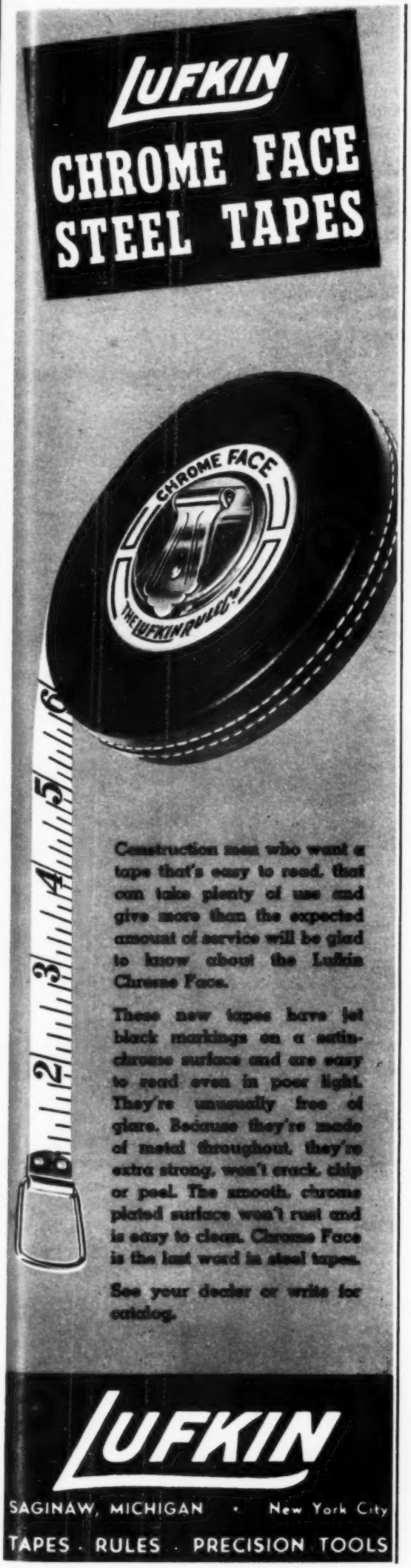
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divided that headings can be driven in two directions from all other shafts, and this procedure is followed at 20 shafts in all, including shaft 9.

Shafts are spaced an average distance of 3 mi. and a maximum distance of 5 mi. apart, and the length of heading to be driven in one direction at any shaft ranges from a little more than 1 mi. to about 3 mi. All utilities, men and materials enter the tunnel through the shafts, and all muck is hoisted to the surface through the same openings. Careful coordination of tunnel construction operations is necessary to make best use of shaft hoisting facilities, especially where two headings are being driven.

Tunnel Driving

In contrast with the progress of 75 ft. in a 6-day week which the skilled organization of Patrick McGovern, Inc. could expect to maintain in hard rock headings on its $46,000,000 contract for city tunnel No. 2, started in 1928, present aqueduct contractors are able to average 150 ft. per heading in the same period. The increased rate of progress is the result of improvement in tunneling equipment and methods during the intervening years.

An outstanding tunneling record for 31 consecutive working days starting Jan. 11, the start of the Board of Water Supply estimate month for this contract, was made by the Walsh Construction Co. at shaft 4, using methods similar to those employed by other contractors on the aqueduct. In 31 days, Walsh advanced the south heading 1,619 ft. and the north heading 1,481 ft., totaling 3,100 ft. for the shaft, or exactly 100 ft. per day. The rock was excellent Hudson River shale requiring no timbering, and the tunnel was excavated to about 17-ft. diameter.

In general, each heading on the aqueduct is equipped and manned as a separate operation. Drill crews not only drill and load the headings, but also, during mucking, assist with the mucking operations, scale the headings, extend ventilation pipes and air lines and take care of other tunneling requirements. A limited number of laborers is employed to do work not performed by the drilling crews. Under this arrangement, as many as 36 complete operations in drilling and mucking have been performed in one heading and progress of 382 ft. has been made in a 6-day week.

Hoists and Cages

At all shafts the steel framing for supporting the cage guides is attached to or braced from the concrete lining. Cage guides ordinarily are steel, although timber guides are used at several shafts. Each cage is equipped with safety dogs; the minimum equipment, used on many of the cages, consists of one set of two safety dogs. Monthly tests are made to check the mechanical condition of the safety dogs. At the surface, landing dogs are provided for all cages.

Hoisting cages are generally of three

(Continued on page 90)

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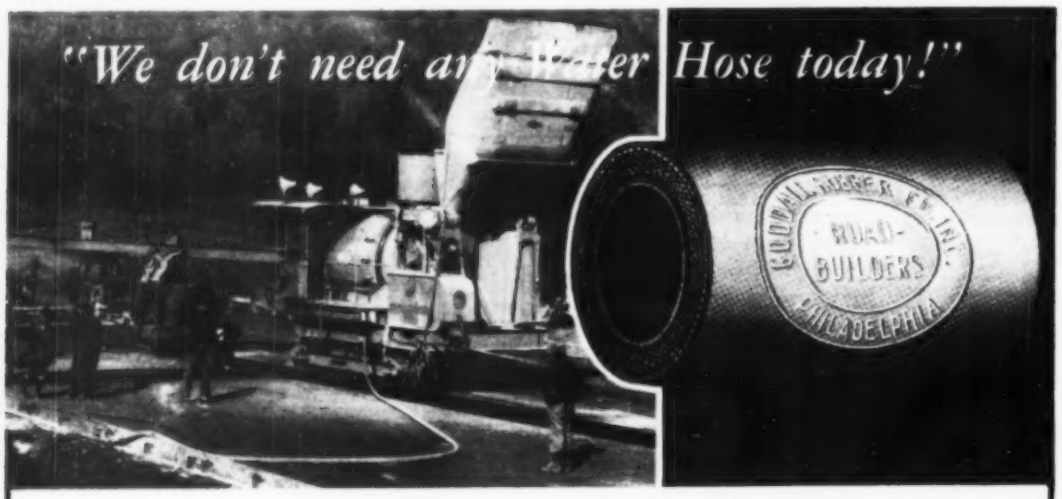

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(Continued from page 89)

types: (1) cage over skip in tandem — two sets, balancing each other, operated by one hoist; (2) cage over skip in tandem—one set, balanced by counterweights, and (3) one cage and one skip — balanced by weights under cage. Diameter of the hoisting drums varies in general from about 6 to 10 ft., and hoisting speeds range from 400 to 1,000 ft. per minute. Capacity of the hoisting skips on various contracts is from 5 to 12 cu.yd.

A typical surface installation for ventilation consists of two reversible blowers having a capacity of 10,000 to 12,000 c.f.m. The blowers are connected with the headings by sheet metal pipes 22 to 28 in. in diameter. Under normal procedure, blowers are set to exhaust air from the heading just prior to a blast, and they continue to draw out fumes and toxic gases for 15 to 30 min. after the blast has been fired. The blowers then are reversed to deliver fresh air to the heading.

When the end of the blower pipe is within 100 ft. or less from the heading, uniformly satisfactory results are obtained. Damage by blasting and drafts on the workmen make it impracticable to keep the end of the pipe much nearer than 100 ft.

On some contracts auxiliary blowers, or Roto-Clones, are located on the drill jumbos and are used to increase circulation of air at the face during the drilling operations. The Roto-Clones combine the functions of exhauster and dust collector, and they normally are equipped with filters through which the cleansed air is discharged into the tunnel.

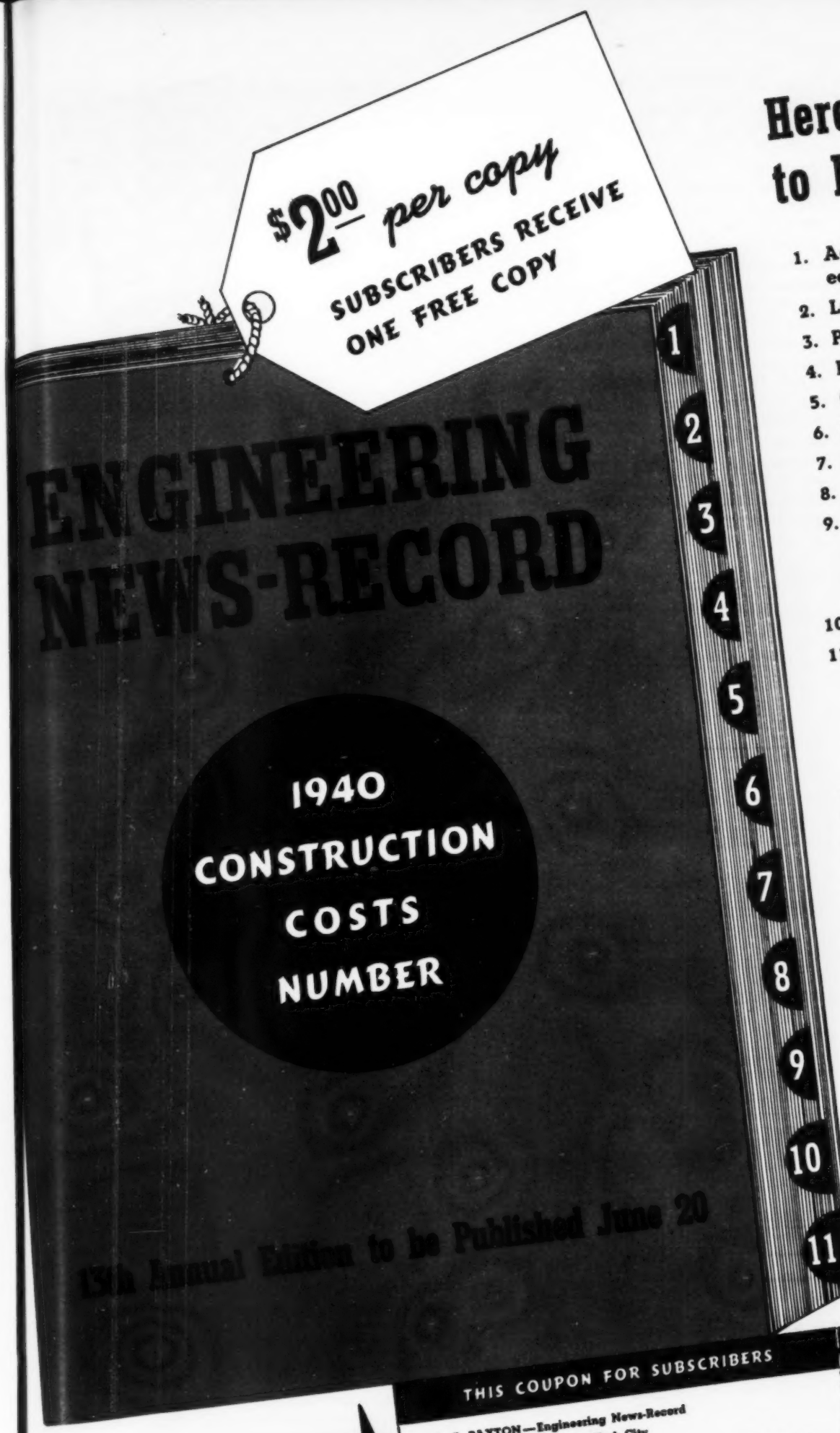
A special condition exists on contract 313 (Samuel R. Rosoff, Ltd.) as a result of the known presence of methane gas in the north heading of shaft 2A. As there is a possibility that the gas may be encountered in some other headings, the blowers at the three shafts on this contract are set to exhaust at all times. During drilling operations, Rosoff's Roto-Clones are used as auxiliary blowers, with filters removed and with flexible tubing connecting the exhaust ports with the ends of the main ventilation pipe. No mucking is done if methane gas is present, and the auxiliary blowers are not used during this later phase of the tunneling operations.

Electric Power — Electric current is taken into the tunnels at 2,300 v. and is transformed to 440, 220 or 110 v. by dry transformers near the shaft bottoms. As the headings advance, dry transformer units are carried farther into the headings to save line losses from low voltage transmission. The transformers are always connected back to the main transformer station by unspliced armored cable.

Roof Support

Need for steel roof support varies widely on different parts of the aqueduct. West of the Hudson River, the rock consists predominantly of shales and sandstones conducive to fast tunnel driving, with timbering required in some headings. East of the Hudson, the formations comprise harder

(Continued on page 92)



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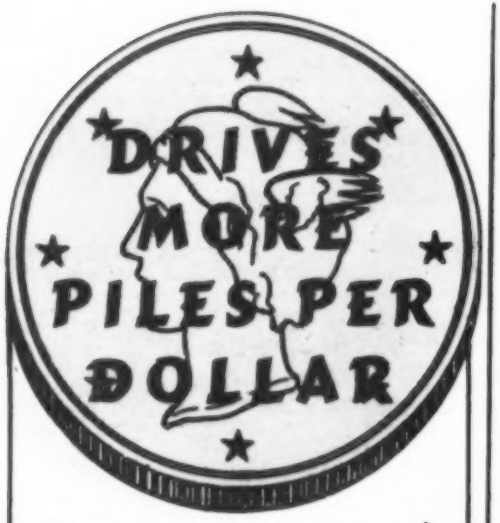

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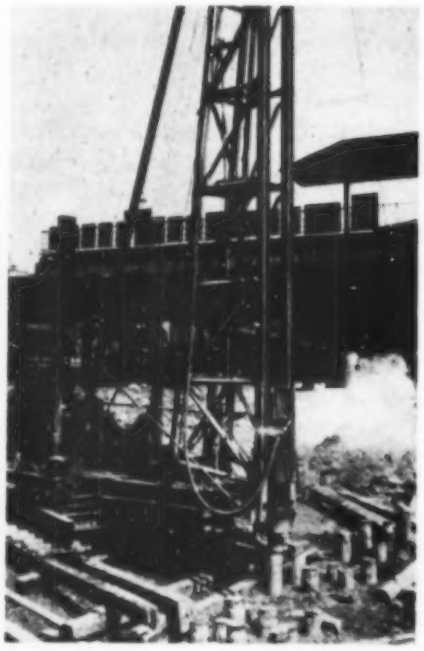

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(Continued from page 90)

gneisses, limestone and Manhattan schist which demand installation of roof support in the tunnel. Up to the time of writing these notes, steel roof support had been installed in about 33 per cent of 13½-ft. tunnel, 40 per cent of 15-ft. tunnel and 100 per cent of 19½-ft. tunnel.

Accompanying photographs show various modifications of steel roof supports worked out by contractors in attempts to simplify handling and erection. Differences of opinion exist among contractors as to the use of steel supports or protective coating of the Gunite or Shotcrete type where the character of the rock makes the need for roof support questionable. As tunneling work has progressed, use of protective coating has been viewed more favorably for headings where the rock is not definitely heavy. The protective coating has given satisfactory results, and more extensive use is expected.

Drill Carriages

To speed drilling operations, all headings are equipped with mobile drill carriages, or jumbos, mounted on wheels which travel either on the 36-in.-gage tunnel track or on separate rails laid outside the regular track. The framework of the drill carriage, ordinarily made up of steel shapes or pipe, carries at the front end adjustable columns and arms for mounting the drills. Drillers work from timber platforms set on frames. Side platforms frequently are so constructed that they can be folded out of the way when the carriage is in transit.

All contractors drill full face headings with automatic-feed wet drifter drills which are equipped with automatic combination valves designed to turn on air and water simultaneously. Wet drilling is important to keep down the concentration of dust particles, as the rock in general contains a large percentage of free silica. From batteries of electric-motor-driven compressors at the top of the shaft, air is delivered to the drills at 100-lb. pressure through steel pipe ordinarily 6 in. in diameter. One contractor uses detachable bits, and the others employ conventional forged drill steel. Forges and drill sharpeners are located in shops on the surface at each shaft.

Depending upon the diameter of the excavated tunnel, which ranges from about 17 to 24 ft., the number of holes drilled per round varies roughly from 45 to 90, and the number of drills in use from 5 to 9. Average depth of drilled holes is about 9 to 11 ft., with cut holes running deeper. The time required to drill a full round is normally 2½ to 3 hours.

Explosives — Specially designed cars handle explosives from the surface into the headings. Gelatin dynamite in 40 and 60 per cent strengths is the explosive generally used. Instantaneous and delayed exploders are employed; the number of delays varies in accordance with the type of rock and with the arrangement and number of holes drilled, but a rough general average would be about eight. Heitzman

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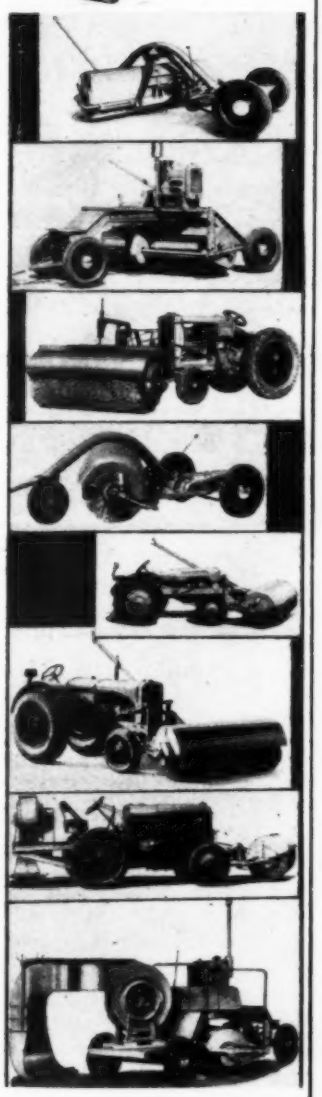

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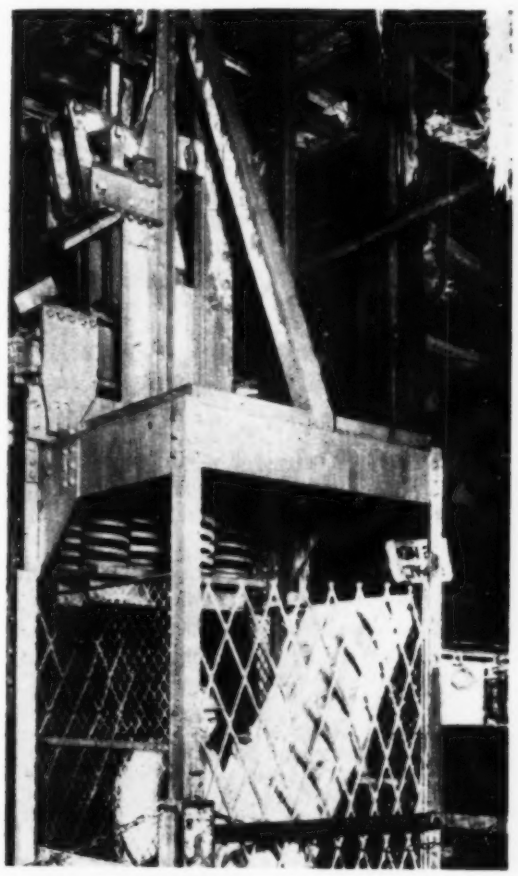
safety plugs are extensively used for stemming. The average advance per round is about 8 to 10 ft., and the powder factor generally lies between 4 and 5 lb. per cubic yard.

Muck cars are of 5- or 6-cu.yd. capacity, generally designed to dump to either side. On contracts where rotary dumpers are used, as illustrated by several accompanying photographs, the cars are of the non-dumping type. Skip pockets are excavated below tunnel grade at the bottoms of the shafts to permit dumping through chutes into the skips. Several contractors have equipped their muck cars with automatic couplings to facilitate switching operations.

Storage battery locomotives are used on all contracts except one which operates trolley locomotives. Each heading ordinarily is equipped with two storage battery locomotives and with sufficient battery units to provide continuous service. Battery charging stations ordinarily are located in the tunnel, but in some cases the batteries are brought to the surface for charging. Because of their greater economy on grades and long hauls, one contractor is operating two diesel locomotives equipped with special exhaust devices which dilute the exhaust gases and eliminate dangerous sparks.



SAFETY DEVICE ON CAGE in Rosoff shaft prevents cage from dropping in case of cable break. Tension in hoisting cables maintains compression in eight coil springs by a series of levers and wedges, keeping Archer safety dogs clear of guides. Break in cable relieves spring compression, causing two sets of safety dogs to grip sides of steel guides as result of lever and wedge action. One set of dogs can be seen on guide rail at top of cage.

Loaded trains, made up at the cherry picker, normally consist of four to six cars. The cherry picker, or car lifter, is

(Continued on page 94)

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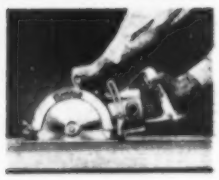

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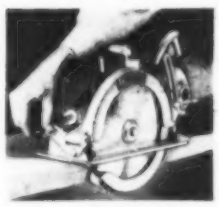

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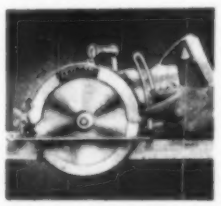

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WIDENING TUNNEL INVERT to accommodate two-track turnout on Rosoff contract section, side walls beyond switch are cut vertically and wall plates are supported on timber posts.

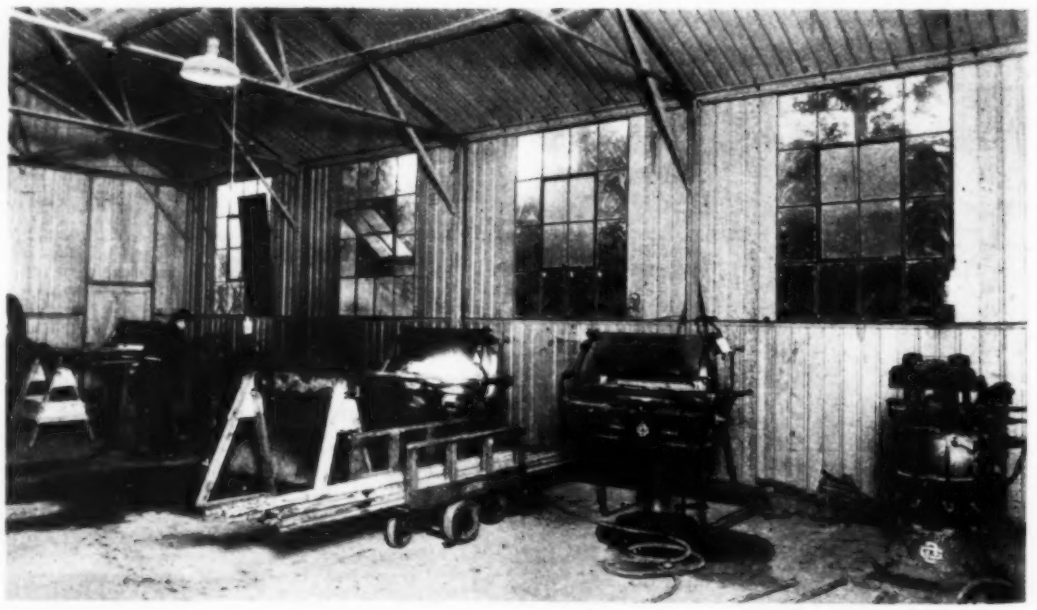
(Continued from page 93)

a miniature hoist used over the single track tunnel railway to lift empty cars out of the way so that other cars may pass on the track. Accompanying photographs illustrate two types of cherry pickers mounted on drill jumbos. On some other contracts, the cherry picker is a separate unit. Several contractors use lateral switches instead of cherry pickers.

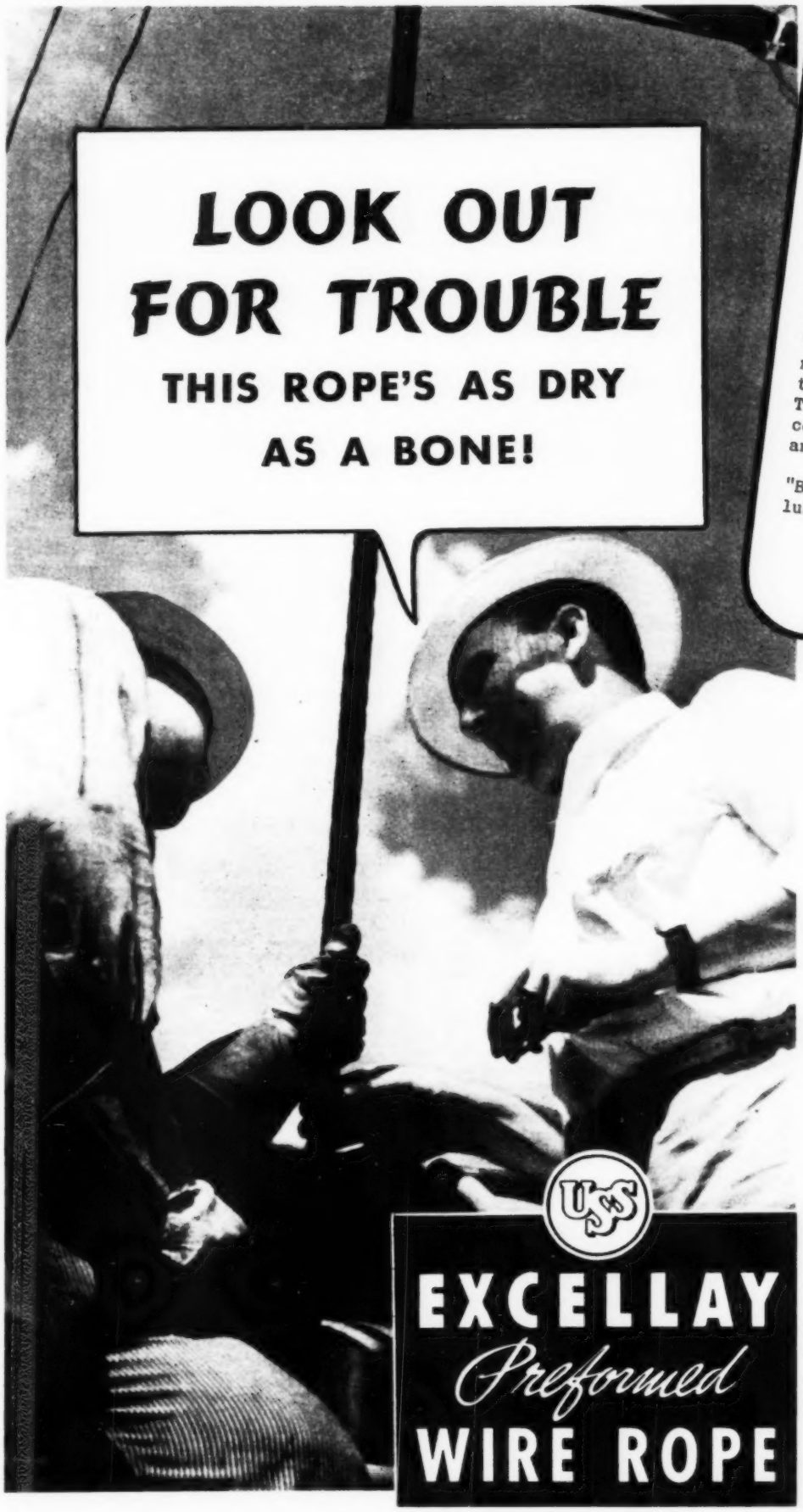
On all contracts muck is loaded by Conway electric mucking machines, generally 440-v. 60 hp. ¾-cu.yd. units. Where two headings are being driven from one shaft, it is customary to have a mucking machine in each heading, with a third unit in the tunnel to serve as a spare. Two of the photographs show machine mucking operations. When a car has been filled, it is pulled a short distance beyond the cherry picker, which places a suspended empty car on the track to be moved up to the mucking machine at the head of the train.

Administration

Planning and execution of all work on the Delaware aqueduct are under the direction of the New York Board of Water Supply, of which Walter E. Spear was chief engineer until his death on March 29. Charles M. Clark is now chief engineer, and Roger W. Armstrong is deputy chief engineer. For administrative purposes, the project has been divided geographically into three departments, with the following department engineers in charge: Eastern, Harry R. Bouton; Northern, Neil C. Holdredge; Reservoir, James A. Guttridge.



DRILL SHARPENING AND BLACKSMITH SHOP at shaft 2 on Rosoff contract is equipped with three Gardner-Denver oil forges and two pneumatic drill sharpeners. Building is of Blaw-Knox knock-down portable bolted steel construction.



Was out on a job with Mr. Long this A.M. when I came across a wire rope that was badly in need of lubrication. "Look out for trouble here," I told him, "this rope's as dry as a bone."

He looked it over. "Looks okay to me," he said, "not much wear."

"That's just the point," I told him. "You can't see what goes on inside a rope. When it's not lubricated, the external appearance may deceive you. The inside wires may be badly worn and corroded and even broken from abrasion and binding."

"Better give that rope a good dose of lubricant if you want to save it."

Yours,

Al

BY keeping your wire ropes properly lubricated, you save money two ways: You protect the rope from premature failure; and you reduce friction.

Proper lubrication is an effective deterrent to corrosion. It protects both inside and outside wires against destructive rusting. It keeps all wires free to slide over each other, as they must do when the rope bends over sheaves and drums. It minimizes friction and wear between individual wires, and between the rope and sheaves or guides through which it passes. It is the safest, surest method of preventing excessive wear inside the rope, where you can't see it.

See that all wire ropes are properly lubricated at regular intervals. Insure greater safety—prolong rope life—reduce lost time—get the benefits of fewer replacements. For specific recommendations on wire rope lubricants and lubrication practice, see the Tiger Brand Wire Rope Engineer who contacts you.

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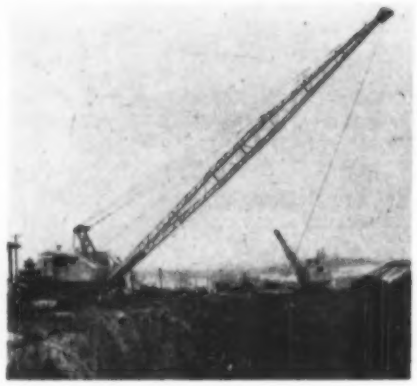

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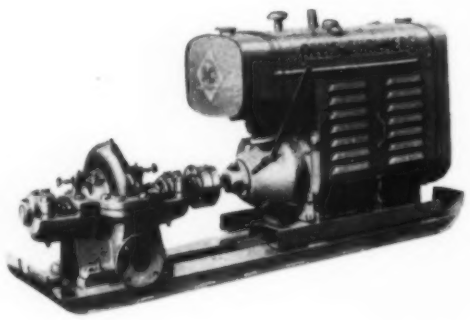
CONSTRUCTION EQUIPMENT NEWS . . . *Continued*

ENGINE-DRIVEN CENTRIFUGAL PUMPS are independent of outside sources of power and are therefore valuable not only as emergency standby units to municipal and private water suppliers, but also as independently powered units for use on drainage, irrigation and construction projects and for gravel and coal washing plants. Power units avail-



able in five sizes, 18 to 110 hp., and permit choice of fuels: gasoline, kerosene, distillate, natural gas or butane. They have valve-in-head, medium speed engines with removable cylinder liners, cooling systems, force-feed lubrication and variable speed governors. Pumps are horizontal shaft, single stage, single or double suction units designed to handle liquids at normal temperatures. To facilitate handling, engines and pumps are mounted on base and may be had in various combinations to meet desired requirements in quantity and pressure up to 5,000 g.p.m. and 100-ft. head. — **Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee, Wis.**

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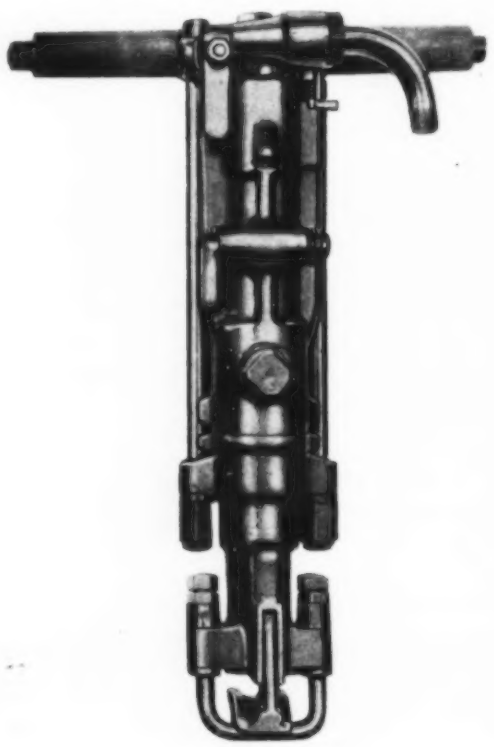
SINKING DRILL 67 lb., said to provide greater power with less weight and to supply need for drill of a size between 55-lb. unit and heavier machines weighing 75 to 80 lb. For use where increased footage in hard ground is desired, for general drilling in construction and quarry fields and for shaft



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This library is intended for —

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[2] The young men in the building industry who intend to make the business of construction their life work, and who want the kind of guidance that will aid them to climb to the top.

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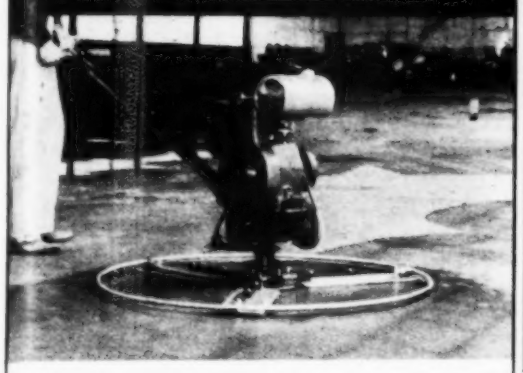

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On the new Shore Parkway project at Brooklyn two centrifugal pumps one an 8-inch and the other a 4-inch, clogged and quit. Two "Can't Clog" G & R 6-inch pumps replaced the quitters and for weeks pumped 24 hours per day.

Gorman-Rupp Pumps Can't Clog. They are not quitters. That's why MORE CONTRACTORS ARE STANDARDIZING ON GORMAN-RUPP PUMPS THAN ANY OTHER MAKE. They will pump MORE WATER and pump MORE HOURS at LESS COST.

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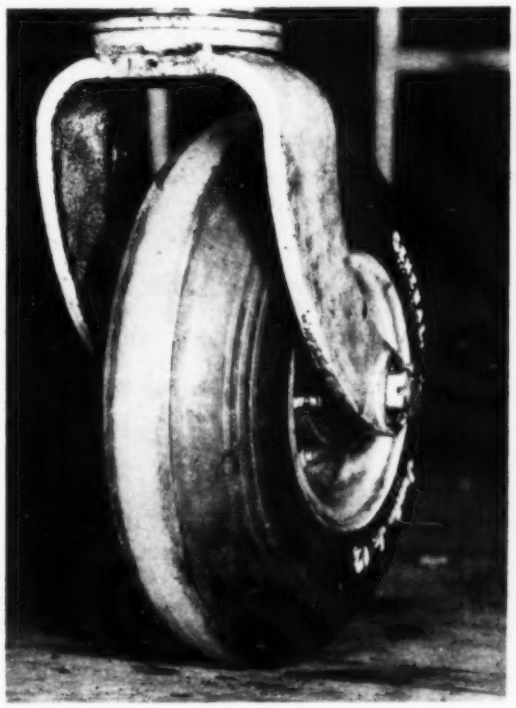
sinking. Advantages: (1) Four-pawl rotation feature, pawls reversible for double wear; (2) valve design said to permit unrestricted admission of air with extremely short valve stroke; (3) drop-forged cylinder has bushing with renewable bronze liner; (4) large oil reservoir surrour ·· cylinder bushing and feeds oil automatically to oil working parts of drill. Sinker has ¾-in. side rods with long cap nuts to protect thread.—**Gardner-Denver Co., Quincy, Ill.**

★ ★ ★

PNEUMATIC INDUSTRIAL CASTER UNIT TIRE for use on industrial trucks is thick, heavy-duty 10- and 12-in. ply pneumatic tire with smooth narrow tread. This tire is used on heavy-duty caster wheel unit in front of truck and regular 18-, 20- and 22-in. tires are used in rear. This combination said to enable truck to carry maximum payload without difficulty. Previous efforts to develop pneumatic tire for this purpose had failed because of wiping action caused by comparatively large area of rubber in contact with floor surface, preventing caster wheels from turning as easily as required.—**General Tire & Rubber Co., Akron, Ohio.**



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ALL-ALUMINUM OVERHANGING LADDER 22 in. wide for use in repairing dams, bridges and buildings, was originally built for Tennessee Valley Authority. It is designed to fit over top of dam and is held away from breast of structure enabling workmen to get good foothold on rungs in climbing up and down. Wooden wearing blocks are fitted to top where ladder comes in contact with concrete. Guardrail 22 in. wide and 27 in. deep runs from top to 22x24-in. platform at bottom. Weight 84 lb. Can be carried readily and yet is strong enough to support three or four men.—**Aluminum Ladder Co., 373 Adams St., Tarentum, Pa.**

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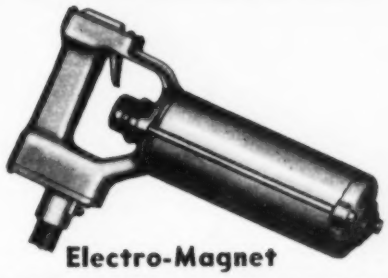

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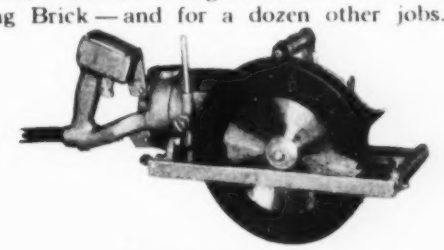

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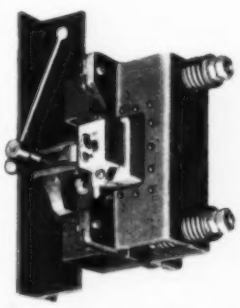

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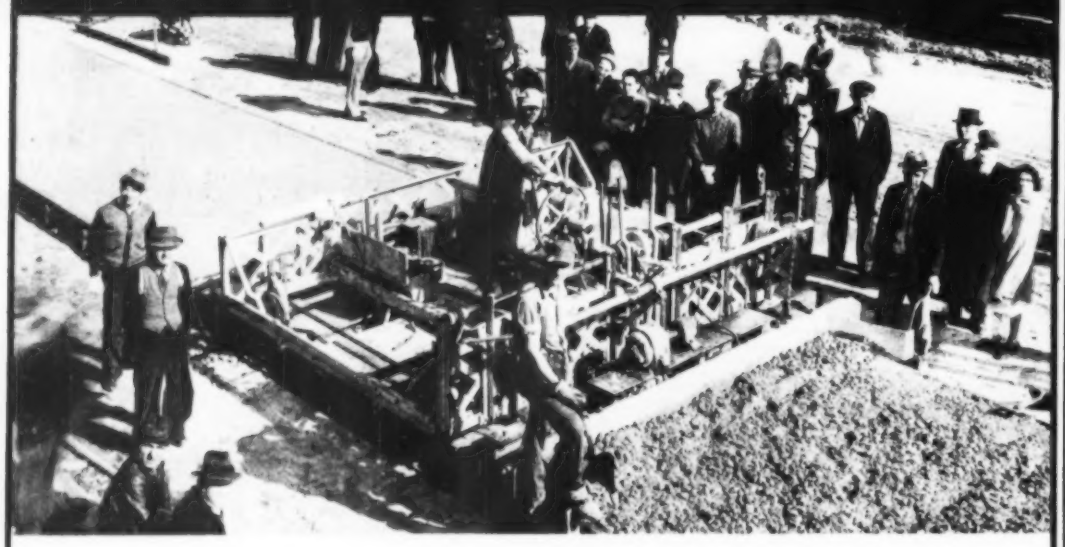

A harsh, dry mix with one vibrator! A perfect finish in one pass. The sectional screed cuts off exactly the amount of concrete needed without waste. Pay for your finishing machine in savings; it can be done only by "FLEX-PLANE".

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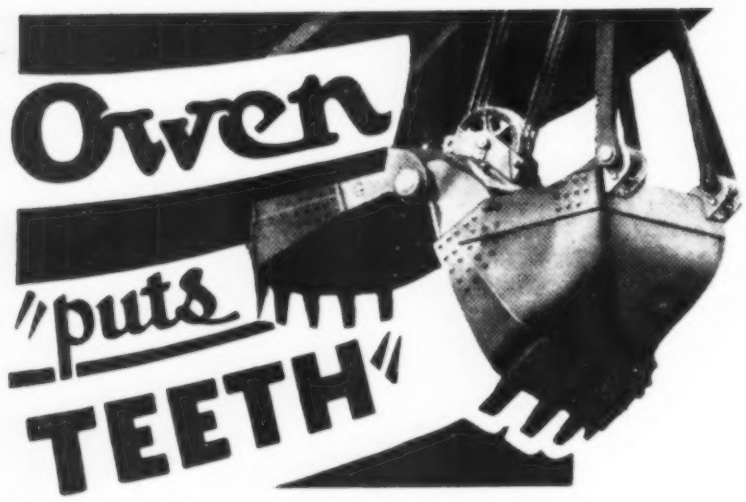

Owen "puts teeth into your digging" with unusual results by equipping an extra efficient bucket with teeth particularly adapted for the work at hand.

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-in Your Digging

WORLD'S FAIR TRYLON GETS *Plywood Overcoat*

(Continued from page 51)

and working down, workmen inside the Trylon knocked off the old sheathing, which fell to the ground. Plywood application was started at the top of the Trylon, materials being hoisted inside the structure by hand ropes to temporary platforms erected at intervals inside the steel frame.

Bracket Scaffold

To facilitate safe erection of plywood, the Fair's construction department designed steel scaffold brackets equipped with hook bolts for fastening to the vertical I-section purlins of the Trylon. As indicated by an accompanying sketch, the horizontal bearer member of the bracket was riveted at two points to a 2x2x¼-in. angle bent to a shape which forms both the lower leg of the bracket and the post for the scaffold guard rail. The hook bolt, which engaged the back flange of the I-section purlin, was installed in a hole at the inner end of the horizontal member. As an aid to erection only, the lower leg of the bracket was fitted with an angle hook which could be used to support the bracket temporarily on a wooden nailer until the hook bolt was turned up tight.

Before specifying this bracket design for use on the job, the construction department tested a pair of brackets under a total load of 8,558 lb., equivalent to a uniform loading of 400 lb. per square foot on the scaffold in actual service. As a result of this test, the State Department of Labor approved the bracket for use on the Trylon. The contractor supplied a sufficient number of brackets to support three scaffolds completely around the structure. Carpenters and painters thus were able to work on two levels while the iron workers were moving down the third set of brackets.

Original wood grounds and nailers of the secondary wall framing, attached to the steel purlins by 5/16-in. self-tapping screws, were still in good condition to take the nails of the plywood siding. Successive courses of plywood were erected with vertical joints staggered, and the carpenters installed 2x4-in. cats between the horizontal 2x4-in. nailers to back up these joints.

From temporary plank platforms inside the Trylon, plywood panels were passed up to carpenters on the scaffold. Before being erected, each sheet was buttered along the top edge and the two ends with calking compound. The carpenters then set the sheet and fastened it to the nailers

and cats with 6d. nails on 6-in. centers. Before brushing on the first coat of rubber-base paint, the painter sealed and wiped the joints with a putty knife.

Progress

In good weather, the erection crew could cover and paint 20 ft. of the Trylon in a day. Rainy days caused delays because paint could not be applied to the wet plywood. As the work moved down the Trylon, increased working space permitted employment of more men to cover the enlarged wall area, and the rate of progress remained about constant. At the 320-ft. level, where the accompanying photographs were taken, the working force consisted of 19 men: 12 carpenters, 4 ironworkers (to erect scaffolds), 2 painters and 1 laborer. Seven of the carpenters in this crew were nailing plywood, and the remaining five, with the single laborer, were raising materials.

Stripping of the stucco and gypsum board started Jan. 15, and the first plywood was erected Feb. 1. It was expected that the plywood portion of the job would be finished by the middle of March. Stucco covering of the lower 75 ft. and painting of the entire Trylon, included in the $35,000 contract, were scheduled for completion well in advance of the opening of the Fair's second year on May 11.

For the New York World's Fair, Inc., A. J. Dillon, project engineer, directed the planning and execution of all work on the Trylon, under the general supervision of John P. McInerney, construction superintendent. John A. F. Johnson is president and Edwin Johnson vice-president of the J. A. J. Construction Co., contractor, Brooklyn, N. Y.

* * *

Speed MARKS EARTH-MOVING AT HANSEN DAM

(Continued from page 55)

bankment is done by eight passes of a sheepsfoot roller, made up of two 4-drum units side by side, in a heavy steel frame 22 ft. wide, drawn by a 125-hp. tractor.

The contractor's repair shop on this job, representing an investment of some $50,000, was a busy place on Sundays with 150 men at work inspecting, overhauling and servicing equipment. No material was placed in the dam on Sundays; the other six days were on a three 8-hr. shift basis.

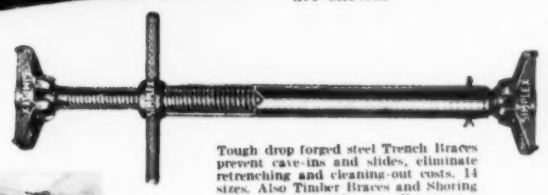
At this shop the contractor did not hesitate to rebuild and even to design and build new equipment in some cases. For example, to get more speed out of some

(Continued on page 100)

Let these Simplex Jacks save for you!

Busy contractors, builders and engineers are saving time and money with these Simplex Jacks specially designed to conserve man-power, speed up operations and eliminate costly equipment that eats into profits. There's a Simplex Jack for every job and many jobs for every jack. A few are shown.

Inverted Ratchet Jack for supporting construction forms. Provide fast accurate leveling. One of several types.



Tough drop forged steel Trench Braces prevent cave-ins and slides, eliminate retrenching and cleaning-out costs. 14 sizes. Also Timber Braces and Shoring Jacks for excavations, wells, sumps, temporary columns, roof raising and tunnel work.

No. 5950 Pipe Puller simplifies service pipe renewal. No. R-332-R Pipe Puller and Pusher speeds installation, eliminates costly trenching and damage to lawns, streets, sidewalks. Ideal for housing projects.

No. 522, new Emergency Jack, is worth its weight in gold on construction jobs. Tilts on base for jacking at an angle. Lifts on cap, corrugated toe, auxiliary cap show or at any intermediate point by using the cap chain as a sling. Quickly, easily lifts 5 tons, 14 inches. Double socket for close-quarter jacking. Moves boilers, stone sills, lifts mired trucks, moves large diameter sewer pipe, etc.

Simplex Ball Bearing Screw Jacks, Journal Jacks, Geared Jacks, Cable Pulling and Tensioning Jacks, Trip Jacks, Automatic Raising and Lowering Jacks and scores of other jacks are likewise saving daily for contractors.

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SIMPLEX Jacks

Awarded the Gold Medal for Safety

Send For Simplex Bulletin Const. 39 and No. 139

NEW! Reliance 3-WHEEL pneumatic tire ROAD SWEEPER

Does more in less time for less money!

3-Wheel Chassis provides balanced, 3-point suspension. An extremely short turning radius, makes unit exceptionally easy to handle and steer. A new method of raising and lowering gives quick, easy positive control of broom. The frame is all steel construction . . . eliminates a considerable amount of unnecessary weight. The machine is simple, foolproof, durable and costs less to maintain. Send for Catalogs 10 and 28 . . . for complete information about the RELIANCE line of Road Building, Maintenance and Quarry Equipment.

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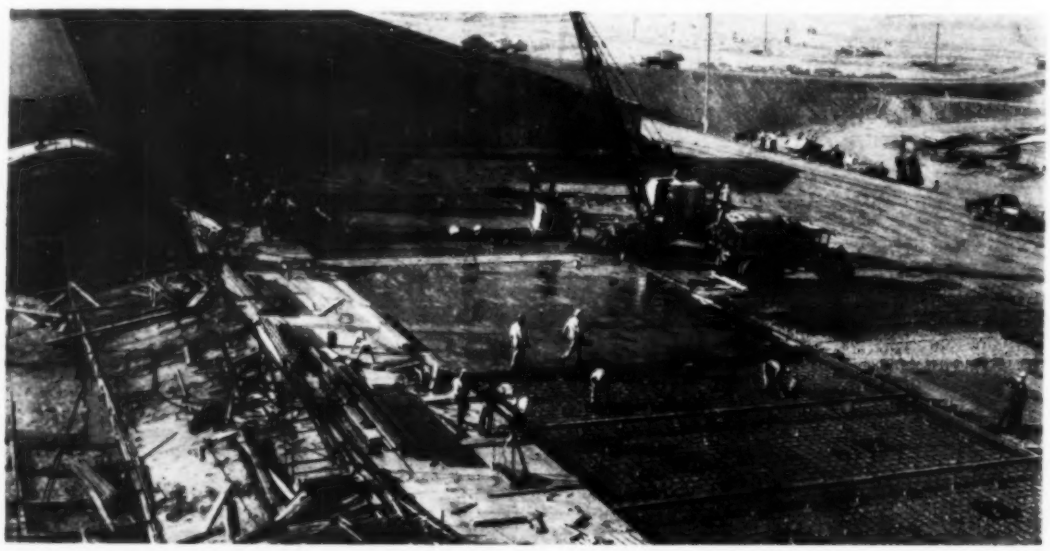
(Continued from page 99)

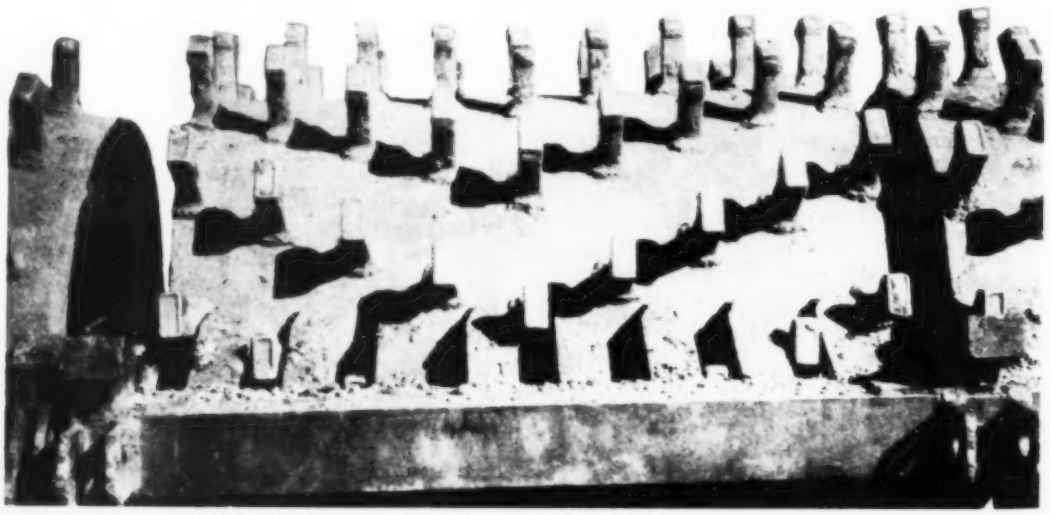
of the tractors assigned to the scarifiers, the standard 125-hp. motors were replaced with the 160-hp. type designed for the Tournapulls. This involved a major reconstruction job on the "cats," with changes in transmission to prevent danger to the rig from overpowering.

Working under the direction of the U. S. Engineer Department Lieut.-Col. Edwin C. Kelton, district engineer, the contractor's organization was headed by Geo. H. Atkinson, job manager; A. Earle Holt, general superintendent; D. E. Root, chief engineer; John A. Kier, assistant superintendent and E. M. Jennett, assistant manager.

LUBRICATION FIELD-SERVICE TRUCK, operated by four-man crew, applies oil and grease to contractor's equipment on job. Compressor supplies air for grease gun and 2½-kw. generator provides electric light for night work. Truck completely lubricates largest tractor in 8 min



SIZEABLE CONCRETE JOB, in addition to earth-moving operations, is involved in building Hansen dam. Truck cranes place concrete for spillway apron (at right), with partially completed rollway section at left



HERRINGBONE ARRANGEMENT of feet of roller is feature of drum rebuilt in contractor's shop to increase effectiveness of tamping action and prevent clogging.

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TABLET
DISPENSERS

Production as usual in hot summer weather, minus the bugaboo of "heat sickness", is found on the jobs where M.S.A. Salt Tablets are available! Three new and outstanding efficient M.S.A. Dispensers, ranging from the handy One-at-a-Time metal pocket unit through the "350" and "1500" Dispensers—made of corrosion-proof and breakage-resistant Bakelite, dustproof and weather-proof—provide in easy to take tablet form the salt necessary to replenish that lost from the body by profuse sweating. Write for the details on these positive Dispensers of one salt tablet at a time, *every* time!

M.S.A. SANITARY PORTABLE DRINKING FOUNTAIN

Cool, clean water—supplied under pressure from a sanitary "bubbler"—wherever the job may be! That's the net of this modern fountain, successor to the disease-spreading bucket and dipper. Quick-acting, positive bubbler saves time, avoids waste; insulated tank keeps cold water cool for hours, holding day's supply for average crew. Pressure is maintained by occasional strokes of the pump; *it is not necessary to pump while drinking*. Ruggedly built—may be attached to vehicle or carried by strap. Specifications on request.

M.S.A. FIRST AID KITS AND MATERIALS

M.S.A. All-Weather First Aid Kits, available in 10, 16, 24 and 36-unit sizes, offer complete protection to their individual fills of unit-packaged, selected first aid materials. Weatherproof and dustproof, these strongly constructed Kits are designed for hardest service; built of welded sheet steel; equipped with replaceable, flat molded rubber gaskets, and brackets for mounting if desired. Ask for bulletins on these and the complete line of M.S.A. first aid materials for construction service!

24-Unit Kit

MINE SAFETY APPLIANCES COMPANY
Braddock, Thomas & Meade Streets
PITTSBURGH, PENNSYLVANIA
District Representatives in Principal Cities

The Profits are in Lower Operating Cost as well as in Reduced Hazards to Life and Property

Assuming that you have selected a wire rope of high quality and proper construction, there is one other vital consideration that will affect both the safety and economy of your work—*An Adequate Factor of Safety.*

If there is not a proper ratio between the strength of the rope and the *maximum* load to be handled, the rope may be overstressed . . . a condition no rope can long survive, and the result is premature failure — and possibly a serious accident.

For general purposes, it is never advisable for the working load of a wire rope to exceed one-fifth of its breaking strength. This means that the Factor of Safety should be not less than five.

Factors of safety in excess of five, varying up to eight and even more, are often required, depending upon the various classifications of service. For any classification a careful and thorough consideration should be made of all pertinent data, including loads, acceleration, deceleration, speed, length of rope, attachments, size and arrangement of sheaves and drums, conditions causing corrosion and abrasion, and the degree of danger to life and property. Should any doubt arise we suggest that you consult a wire rope manufacturer.

This advertisement is published for the purpose of helping all wire rope users obtain safer and more economical service from their wire rope

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK — 90 West Street
CHICAGO — 810 W. Washington Blvd.
DENVER — 1554 Wazee Street

HERCULES (RED-STRAND) WIRE ROPE

SAN FRANCISCO — 520 Fourth Street
PORTLAND — 914 N. W. 14th Avenue
SEATTLE — 3410 First Avenue South

Want Daytime Efficiency on that Night Job?

National Carbide V-G Light — 8,000 Candle Power without extension — 16,000 Candlepower using extension. Easily handled by one man — No wires, No carbide wasted.

National Carbide V-G Handy Light — 1500 Candle Power — weighs only 37 pounds fully charged.

National Carbide Lanterns — signal of red, blue or green — ideal for emergencies.

NATIONAL CARBIDE CORP.
LINCOLN BUILDING • NEW YORK

Send information on lanterns or V-G Lights with absolutely no obligations.

Name .....
Address .....
City ..... State .....

NEWS FROM MANUFACTURERS *About Their Products*

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use

SPEEDY DIESEL TRACTOR — **Allis-Chalmers Mfg. Co.,** Milwaukee, Wis. (32 pp., illustrated.) Describes Model HD-14 six-cylinder diesel tractor which develops 108 hp. at drawbar and operates at speeds from 1 to 7 m.p.h. Other features include General Motors 2-cycle diesel engine, long wear bi-metallic steering clutches and brakes, positive-seal truck wheels with 200-hr. lubricating interval. Six forward speeds and two speeds in reverse. Wide seat with arm rests insures operator comfort.

★ ★ ★

CARE OF SAFETY GOGGLES—**American Optical Co.,** Southbridge, Mass. (2-p. bulletin, illustrated.) Simple rules on care of safety goggles to assist in reducing goggle replacement and maintenance costs and provide more efficient eye protection for workers. Featured in bulletin are proper methods of sterilizing goggles to avoid face and eye infection and instructions on proper goggle adjustment to avoid discomfort and "loopholes" for injuries.

★ ★ ★

ALL-WHEEL DRIVE TRUCKS — **Marmon-Herrington Co., Inc.,** Indianapolis, Ind. (8 pp., illustrated.) New series of all-wheel drive trucks available in 33 different models with gross capacities from 10,200 up to 70,000 lb. Detailed specifications and summary of important features of design. Four- and six-wheel models, powered with gasoline and diesel engines, have "finger-tip" steering without wheel kick, forward placement of front wheels for climbing steep slopes, and low frame heights and low center of gravity for stability.

★ ★ ★

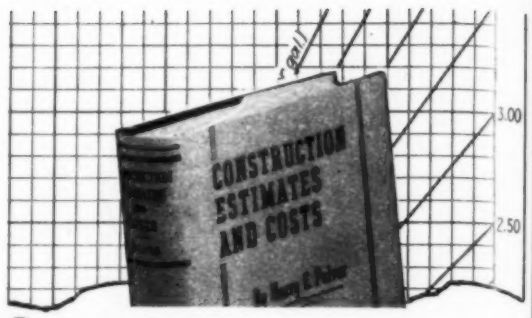
CONCRETE PAVING JOINTS—**W. S. Godwin Co., Inc.,** Baltimore, Md. (22 pp., illustrated.) Describes and illustrates Godwin design for load-transfer joint assemblies, consisting of welded steel trusses in which narrow rectangular dowels slip into sockets. Filler may be of redwood plank, premolded asphaltic strip or other material. Information on essential load-transfer requirements, installation details and comparative designs and actions. Suggested specifications.

★ ★ ★

PULVERIZER FOR ROAD STABILIZATION—**Seaman Motors,** Milwaukee, Wis. (4 pp., illustrated.) Pamphlet describes Pulvi-Mixer, two-wheel trailer attachment driven by power takeoff from tractor and equipped with spring tines on rotating shaft. Unit pulverizes and mixes bituminous road materials in windrow, soils and clay, soil-cement and soil-asphalt emulsion mixtures, clay-sand, clay-gravel, earth shoulders and practically all other combinations of materials for processed and stabilized roads.

★ ★ ★

FINE REDUCTION CRUSHER — **Traylor Engineering & Mfg. Co.,** Allentown, Pa. (7pp., illustrated.) Multi-stage operation is the feature of this Traylor-Stearns fine reduction crusher in which upper stage does 50 per cent of the crushing and functions as efficient feeder for lower or finishing stage, supplying material all around crushing bowl. Crusher head comprises two separate manganese steel bell head mantles of different diameters, assembled one above the other with a common head center and a steel inclined spacer plate between the two. Designed for production of material between ⅛ and 9/16 in. in size.



Save money with accurate construction estimates

You know how much it would mean to you to have more accurate estimates — how much in profits, with less discrepancy between estimated and actual costs — how much in business gained through closer bidding.

Now, here is a book that will help you to achieve these results on job after job, and will pay out further in time saved, by helping you to get accurate estimates more quickly and easily.

Just Published

CONSTRUCTION ESTIMATES AND COSTS

By H. E. Pulver
Professor of Civil and Structural Engineering, University of Wisconsin

653 pages, 6 x 9, many diagrams and tables, $5.00

- Takes up each element of construction work separately; describes and illustrates simple, arithmetical methods of accurately estimating its cost
- Covers every step of the work, from preliminary investigations, through complete, detailed estimates that include overhead, cost of plant, profit, etc.
- Covers both estimating with use of tables and of diagrams. Includes many specimens, with diagrams on 113 different elements of construction work conveniently grouped at the back of the book
- Tables and diagrams show variations in quantities as well as in prices of material and labor. Labor tables and diagrams based upon hours of work and hourly wages. Practically all diagrams are straight line diagrams, easy to read and use
- Many worked-out estimates for typical jobs illustrate methods

Chapter Headings

Estimating in General
Handling and Transporting Materials
Excavation
Piling and Bracing
Concrete
Masonry
Dampproofing and Waterproofing
Wood
Structural Steel
Roofing and Flashing
Lathing and Plastering
Heating and Air Conditioning
Plumbing
Electrical Work
Painting, Papering, and Glazing
Heavy Machinery
Construction Plant and Equipment
Overhead and Profit
Approximate Estimates
Complete Estimates
Construction Management

- Gives contractors and engineers a key to better profits and closer, safer bids, through more accurate construction cost estimates
- Also, completeness and simplicity of treatment makes this a working guide for practical men who want to learn estimating from the ground up

SEE IT 10 DAYS • MAIL THE COUPON

McGraw-Hill Book Co., Inc., 330 W. 42nd St., N. Y. C.

Send me Pulver's Construction Estimates and Costs for 10 days examination on approval. In 10 days I will send $5.00 plus few cents postage, or return book postpaid. (We pay postage on orders accompanied by remittance.)

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(Books sent on approval in U. S. and Canada only.)

Lubriplate Lubricants make good on the

WORLD'S LARGEST CONSTRUCTION JOB

GRAND COULEE DAM

READ THE FACTS!

Paul A. Horwick, Portland, Oregon, tells how Lubriplate stands up when the going gets tough:

"Last Summer I went to Eastern Washington on a relocation project of the Grand Coulee Dam for Jacobsen and Jensen Construction Company of Portland. It was my job to maintain and grease their 1½ yard Link Belt shovels.

"For the first month I was there I believe we tried almost every brand of grease on the market. First, the heat was excessive — running 90 to 120 degrees in the open for 20 to 30 days at a time. Secondly, dust, dirt, and sand, which I have never seen equalled. In the first instance, if we found a grease that wouldn't run when applied to hot gears and bearings, it was too stiff for use in pressure guns—or it melted like butter will do. When it wouldn't melt and drop off, sand and dirt, added in a short time, would make a cutting compound, resulting in rapid and excessive wear.

"After a month or six weeks a salesman from Nott-Atwater Company of Spokane heard of our trouble and came out to see us with a can of LUBRIPLATE No. 110. He gave us a good story about what LUBRIPLATE would do—all of which I later found was more than true. LUBRIPLATE certainly solved the heat and dirt situation besides saving 75 pounds of grease per machine per week. Where we had used four kinds of grease before we afterwards used but two LUBRIPLATE products—Nos. 110 and 130-A. Bearings also cooled down and wear reduced to ⅕ of what we had become accustomed to expect."

ESTABLISHED 1870 — 70th ANNIVERSARY — LUBRICANTS

Try LUBRIPLATE on Your Toughest Job

WHY BUCK TODAY'S PROBLEMS WITH YESTERDAY'S IDEAS? LUBRIPLATE was developed to meet today's requirements. LUBRIPLATE is in a class by itself and possesses features not to be found in other lubricants. LUBRIPLATE has "what it takes" to stand up to heavy duty service—it stays put—and lasts and lasts. And remember this —LUBRIPLATE is a great enemy of rust, and corrosion because it resists water like a duck's back. Write us—we'll see that you receive enough LUBRIPLATE for a thorough test.

Lubriplate Division of

FISKE BROTHERS REFINING CO.

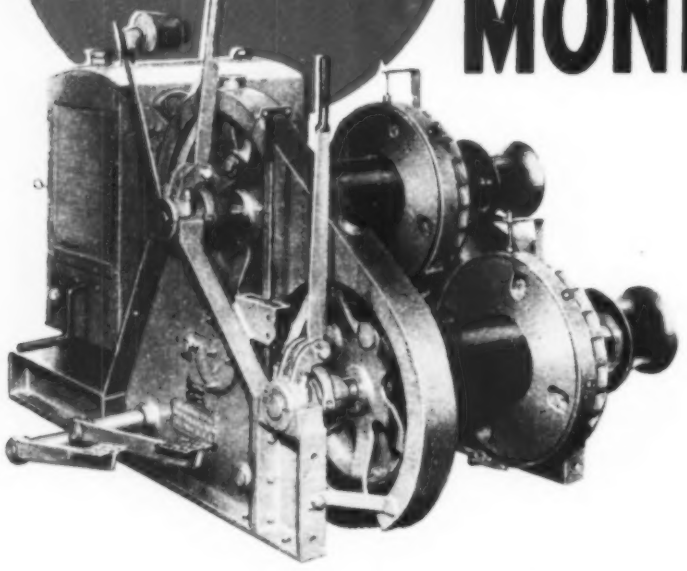
Newark, New Jersey — Toledo, Ohio

Dealers from Coast to Coast

LUBRIPLATE

THE WHITE LUBRICANT THAT MINIMIZES WEAR

MORE HOIST FOR LESS MONEY



THE NEW MODEL 20

AMERICAN GENERAL PURPOSE HOIST

has many features found in no other hoist in its price class — Stand-out superiorities which lift it high above all competitive hoists of corresponding capacity:

For instance:

1. Frictions and brakes are at opposite ends of the drum for cool running.
2. Shrouded ratchet ring with chisel type dog.
3. Drive shaft turns in anti-friction bearings and is placed between the drums — both drums revolve in the same direction.
4. Improved band type frictions; easy to engage; economical.

In a word — MORE HOIST for LESS MONEY.
Write for Bulletin No. 100-H-0.

AMERICAN HOIST & DERRICK CO.

NEW YORK — SAINT PAUL, MINNESOTA — CHICAGO

AMERICAN TERRY DERRICK CO.
SOUTH KEARNY, N. J.

FOR SAFE WIRE ROPE FASTENINGS

STANDARDIZE *on the Genuine* CROSBY CLIP

PERFECT GRIP • DROP FORGED STEEL • HOT DIP GALVANIZED

DEALERS WITH STOCK IN ALL PRINCIPAL CITIES

TRACTORS, GRADERS, ENGINES—**Caterpillar Tractor Co.**, Peoria, Ill. (31 pp., illustrated.) Condensed catlog covers complete line of Caterpillar products including track-type tractors, motor-graders, blade-graders, elevating graders, terracers diesel engines and diesel-electric generator sets. Tractor sizes range from 25 to 97 hp. at drawbar.

★ ★ ★

BRICK AND CONCRETE CHIMNEYS—**Associated Factory Mutual Life Insurance Co.'s.** 184 High St. Boston, Mass. (7 pp., illustrated.) Detailed specifications for the erection and repair of chimneys of brick and concrete more than 50 ft. high, stressing need for proper materials and workmanship to prevent cracking or spalling.

★ ★ ★

MECHANICAL FLOW METERS—**Brown Instrument Co.**, Philadelphia, Pa. (10 pp., illustrated.) Recording and integrating equipment for indicating amounts of steam, water, air, gas and oil required for power and process uses and supplied to each unit of plant. Flow meters aid correct determination of costs and efficiencies. Meters that indicate and automatically control flow also are available. Desirable operating advantages, such as the automatic recording planimeter, the integrator dial and interrelated range tubes are described in detail.

★ ★ ★

200-Ton Girders RAISED ON EDISON BRIDGE

(Continued from page 43)

girder structure of 29 spans with a total length, including approaches, of 4,385 ft.; span lengths range from 80 to 260 ft. Two 24-ft. divided roadways will carry vehicular traffic, eliminating a bottleneck on Route 35 and completing the Perth Amboy-South Amboy bypass. Spanning 200 ft. between piers each of the two big girders extends 60 ft. into the adjacent span.

Fabricated and erected by the Bethlehem Steel Co., each girder was raised into place by two derricks, one a traveling stiff-leg unit of 125 tons' capacity on the land end of the bridge, and the other a 75-ton guyed A-frame on a steel tower mounted on a barge. To brace the long top flange of each 260-ft. girder during erection a system of hog-ties in the form of four transverse I-beam outriggers, each 22 ft. long, was used, with 1-in. wire cable stretched around the ends of the I-beams and anchored to the ends of the girder. Cable X-bracing was also used in the rectangular truss panels formed by the I-beam braces.

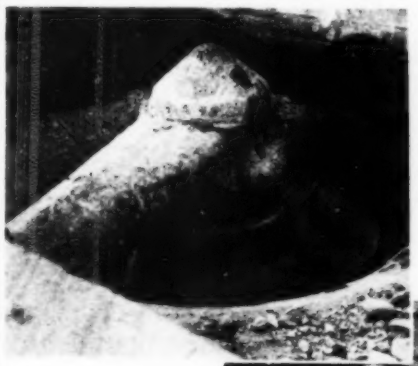
The long, heavy girders, forming part of the 9,500 tons of steel required for the structure, were transported from the Bethlehem works at Pottstown, Pa., to the bridge site by a special train and barges. The 260-ft. girders extended over a length of five cars, although their weight rested on only two cars. In order to clear underpasses en route the lower portion of the 21-ft. deep bend of each girder over the main pier had to be shipped separately and assembled with the upper portion at the bridge site.

TELSMITH

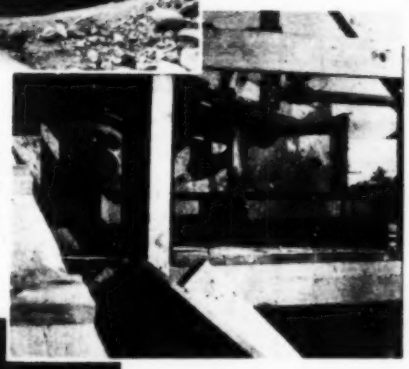
EQUIPPED GRAVEL PLANT SUCCESSFULLY SERVES

Boston Market

General View Crystal Concrete Products Co. Plant

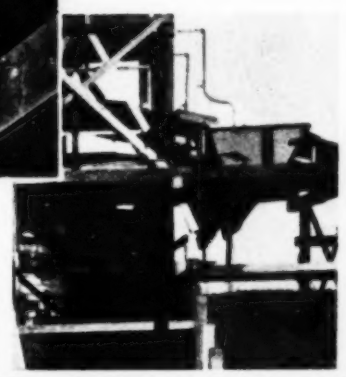


13-B Telsmith Primary Breaker crushes the large boulders to 3 to 4 inches



4-foot x 12-foot Telsmith Triple Deck Pulsator

8-B Telsmith Gyratory Crusher reduces over size from Primary Breaker



Two of the three Telsmith Sand Tanks

● Supplying the Boston market with sand, gravel, and ready-mixed concrete—this new and completely modern Telsmith-equipped plant of the Crystal Concrete Products Co. at Braintree, Mass., is closer to Boston than any other plant of comparable size.

The plant's principal owner, Mr. Thomas A. Hannaford, is both an experienced and large-scale operator. The use of Telsmith equipment is doubly significant.

The bank covers about 150 acres . . . and the plant is now producing 125 tons an hour of 1½-inch and down. This is not top capacity by any means. Even in its breaking-in period the plant produced considerably more.

The equipment, in its flow sheet order, includes: 24″ Telsmith Plate Feeder; 13-B Telsmith Primary Breaker crushing large boulders to 3 to 4″ size; 30″ x 76′ Steel Frame Main Belt Conveyor; 4′ x 10′ Telsmith Single Deck Pulsator; 8-B Telsmith Gyratory Crusher crushing over-size from the primary breaker; 18″ x 79′ Steel Frame Return Belt Conveyor; 24″ x 129′ Steel Frame Main Belt Conveyor; 4′ x 12′ Telsmith Triple Deck Pulsator; one No. 7 and two No. 8 Telsmith Sand Tanks; four Duplex and three Simplex Telsmith Bin Gates, 15″ x 15″.

Like all Telsmith-equipped plants, the operation of this one has been more than satisfactory from the start. Every individual Telsmith unit does its job, with a minimum of attention and upkeep. The entire ensemble runs smoothly —*and profitably*. Planning a new quarry or gravel plant? Modernizing? *Find out* about Telsmith engineering service and guaranteed results. *Get Bulletin G-10.*

G-5-40

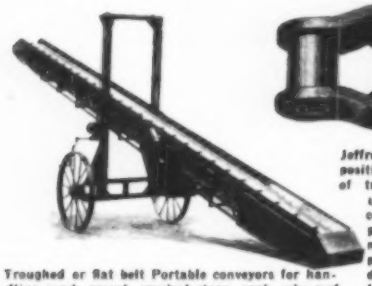
SMITH ENGINEERING WORKS, 510 EAST CAPITOL DRIVE, MILWAUKEE, WISCONSIN

50 Church St., New York City
Brandeis M. & S. Co., Louisville, Ky.
211 W. Wacker Drive, Chicago, Ill.
Charleston Trac. & Eqpt. Co., Charleston, W. Va.
713 Commercial Trust Bldg., Philadelphia, Pa.
Roanoke Trac. & Eqpt. Co., Roanoke, Va.
91 Binney St., Cambridge, Mass.
Chester C. & M. Co., Memphis, Tenn.
Vern Wheeler Eqpt. Co., Columbus, Ohio
Wilson-Wecomer-Wilkinson Co., Knoxville and Nashville, Tenn.
United Steel Sales, Toronto, Ont.

EVERYTHING YOU NEED FOR LOW-COST HANDLING

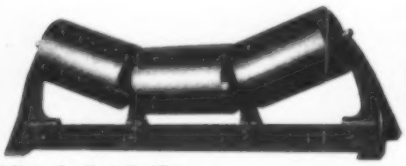
Chains, crushers, conveyors, loaders and unloaders, bucket elevators, screens and feeders . . . all designed and built to provide the utmost in performance and low cost material handling. You'll like the way Jeffrey equipment stands up in the heaviest kind of construction work. We'll be glad to send you engineering data covering the unit you need.

Three types of Jeffrey drive chains are shown. There is a type for every service.

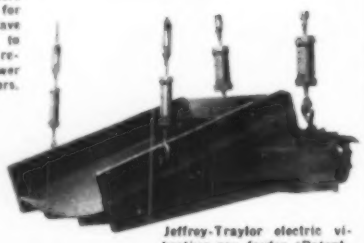


Troughed or flat belt Portable conveyors for handling sand, gravel, crushed stone, coal, coke and cinders. Large capacities. Also bucket loaders.

Jeffrey drive chains afford a positive, yet flexible means of transmitting power for unit machinery such as concrete mixers, dredges, power shovels, ditching machines, road pavers, portable loaders, oil drilling rigs, etc. Send for our Drive Chain catalog No. 725.



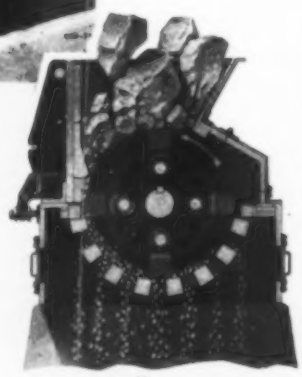
Jeffrey 3-roll belt idlers (above) are designed for universal application. Have every feature essential to provide belt protection, reliable service and power economy. Also 5-roll idlers. They are made of high quality steel tubing with steel ends carefully centered and electric welded. Timken tapered roller bearings.



Jeffrey-Traylor electric vibrating pan feeder (Patented) (above). Provide positive control over tonnage and furnished in all sizes for various capacities up to 1000 tons per hour. Can be supplied with grizzly discharge if desired. Also electric vibrating screens.

•

Jeffrey heavy duty bucket elevator (left). This type of elevator is ideal for handling large capacities of stone. Also vertical spaced elevators with single or double strand chain. Jeffrey engineers have had years of experience in designing elevating and conveying machinery of all kinds.



Jeffrey Miracle Hammer crusher (Patented) (right) for heavy duty service and large capacities of limestone, shale, slag and cement rock. Will take steam shovel size limestone and crush it into pieces 1", 2", 3" or 4" and under in one operation. Also single roll crushers, pulverizers and shredders.

•

Write for literature covering any or all of the above units. We will be glad to give quick and courteous response to your requirements.

The Jeffrey Mfg. Co.

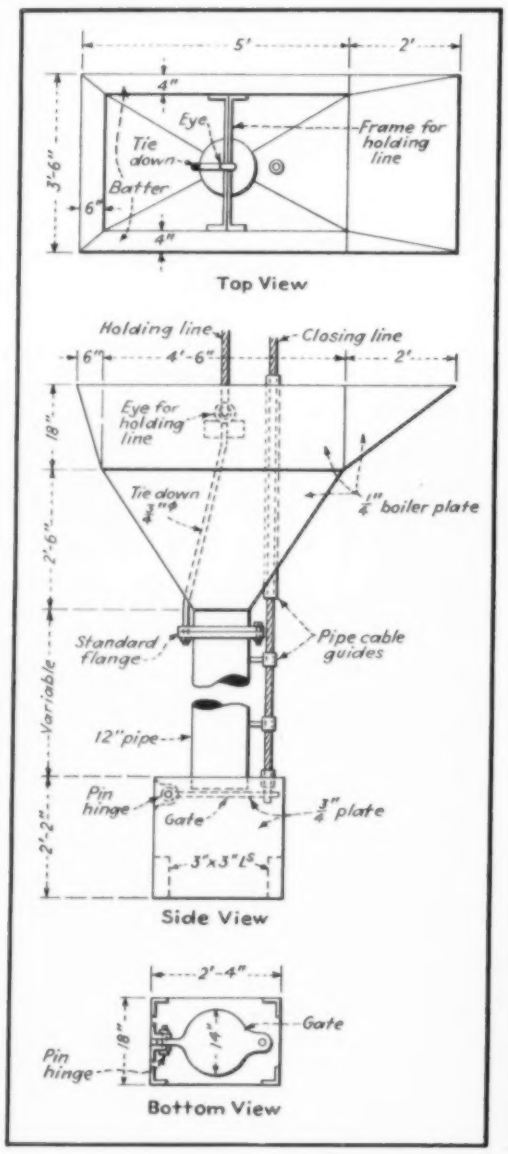
937-99 North Fourth Street, Columbus, Ohio

SALES OFFICES IN PRINCIPAL CITIES

Job-Built Tremie PLACES QUALITY CONCRETE

(Continued from page 65)

the hopper was ¼-in. plate, flame-cut to shape and arc-welded, with attached cross-struts of strap iron to which the holding line was fastened. A flanged nipple under the hopper provided an attachment for 12-in. used pipe of a length suitable for the work. The discharge chamber was welded of ¾-in. plate, stiffened by angle irons in the corners. At the base of the pipe, in the discharge chamber, was the hinged gate,



JOB-BUILT TREMIE incorporates hinged discharge gate, controlled by closing line of crane, at bottom of pipe.

which opened by gravity and closed with the closing line of the crane.

A 1¼-yd. crane was adequate to support the tremie. Concrete could be delivered to the hopper by chute, bucket or concrete pump. To obtain the best underwater con-

In The Construction Field COFFING'S "Safety Pull" ratchet lever hoists are supreme in —

Pulling and lifting heavy machinery;

Installation and maintenance of pipe lines, taking up slack in cables, chains, etc., on all types of conveying equipment;

Pulling trucks and tractors out of mud;

Stretching guard cables on highway;

Pulling concrete forms and posts — road paving;

Shifting railroad tracks;

Repairs and maintenance of cranes, shovels, derricks, etc.;

Capacities range from ¾ to 15 tons.

For full particulars consult your nearest dealer or write direct to factory for bulletin S-1.

COFFING HOIST CO.

C M STREET, DANVILLE, ILLINOIS

CUMMER

ASPHALT PLANTS

Portable Combination Hot and Cold Mix Plants

Portable Hot Mix Plants

Stationary Combination Hot and Cold Mix Plants

Cummer Combination Dryer-Coolers.

Steam Jacketed Mixers 400 to 8000 pounds capacity.

Cummer Internal Fire Dryers

Electric Batch Timers

Cummer Automatic Asphalt Meters

THE F. D. CUMMER & SON CO.

Euclid and 17th Cleveland, Ohio

crete, the pipe was never entirely emptied until a pour was completed. The discharge chamber rested on the concrete, and the gate was opened only enough to allow the mixture to ooze out. An occasional strain on the holding line and a slight swing of the boom, with never a motion that would tend to wash the aggregate, gave a good concrete with a minimum of laitance.

Equipment shown in the two photographs was essentially a 2-yd. tremie, a charge of about 1 yd. being maintained throughout the pour. The hopper held about 1⅔ cu.yd. and the pipe about 0.033 yd. per foot. With this tremie, pours of 500 cu.yd. were completed in 20 to 22 hr.

* * *

Chains and Hooks REQUIRE REGULAR INSPECTION

(Continued from page 65)

nite distance apart, 3 ft. being a convenient distance. If the elongation during its use approaches 1 in. in a 3-ft. length, the chain should be annealed. A stretch greater than this amount will warrant condemning the chain.

The ring of the sling may be considered as a large link, and should be inspected in a similar manner to the chain itself.

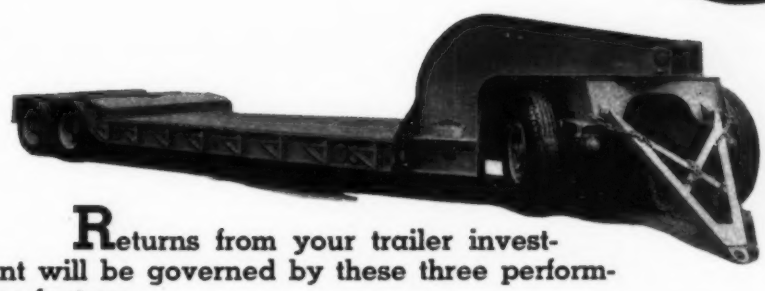
Hooks — The hook should be the weakest part of a sling. It seldom, if ever breaks, but it does fail by straightening out and finally releasing the load. The load on a hook can approach 300 per cent of the rated capacity before serious distortion takes place (See Fig. 2, Hook 2). The inside line of a hook is usually an arc of a perfect circle and any deviation from this circular shape indicates that the hook has been severely overloaded. When it has spread or opened up such as Hook 3 (Fig. 2), it should be discarded at once. Reforging and annealing is permitted only if the deformation has not exceeded that indicated by Hook 2. Attention should also be paid to the neck of the hook, particularly if the fillets at shoulders have a very small radius.

Under no circumstances should the inspector "pass" a chain which has been lengthened by bolting two sections together. Neither should he allow an "eye" to be made by looping the chain back upon itself and bolting together. Chains should never be tied into knots, nor should they be shortened by twisting them. All of these tricks cause excessive bending stresses to be developed in the links, thereby reducing the safe working load which may be applied to the chain.

Remember that old adage, "a chain is only as strong as its weakest link," and then make it your business to find that link and to appraise its strength value. This will be the strength of the chain as a whole.

check for LOADability, HAULability and BRAKEability

ROGERS



Returns from your trailer investment will be governed by these three performance factors.

It must "LOAD" and "unload" easily. Be strong but light to "HAUL" with comparative ease — and be capable of reliable control and quick stopping in the face of emergencies.

You'll find the required features incorporated to the fullest degree in ROGERS Trailers.

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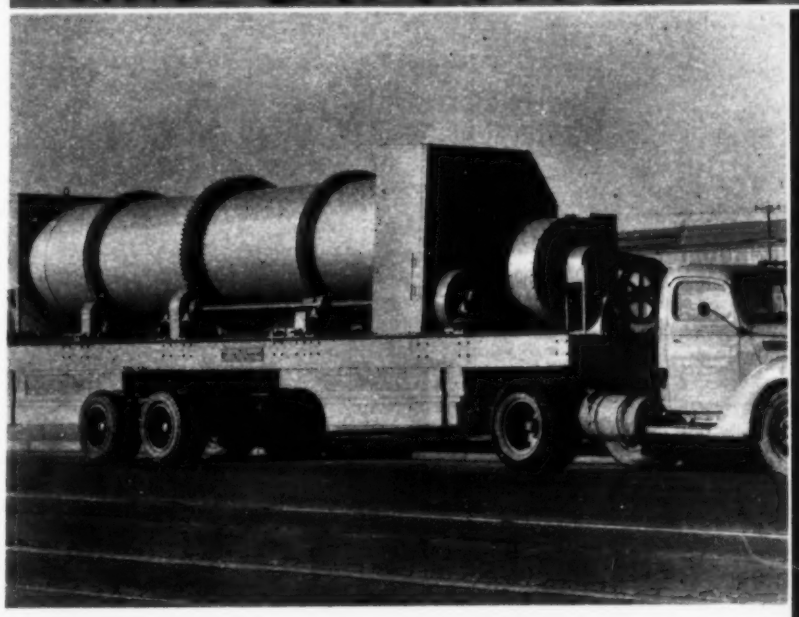

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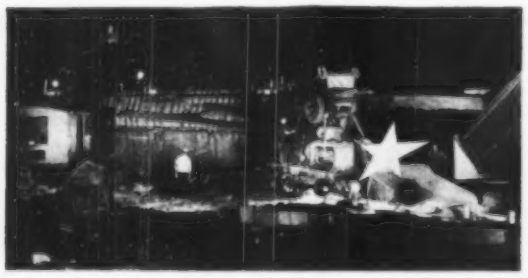
Think of the savings you can make with a Homelite Portable Generator. A complete power plant in itself—operated by a built-in gasoline engine—it gives you all the juice you need (1800 watts) to operate time-saving electric saws, drills, tappers, and other tools. And being easily portable—only 83 pounds complete—it gives you power on any part of the job, without electricity installation costs or without long, troublesome current-sapping cables from a central supply.



2 IT WILL GIVE YOU BRILLIANT FLOODLIGHTING

For the night shift or for emergency work after dark, you can use your Homelite Portable Generator for powerful floodlighting—brilliant illumination that steps up the efficiency of your men and reduces your accident hazards. With the Homelite automatic voltage control your light remains constant—regardless of load. And the Homelite is built to take this 24 hour service—in any kind of weather—without failing.

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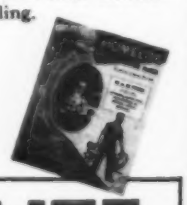
See how a Homelite Portable Generator can make day and night savings for you. Send for our new six page illustrated bulletin



HOMELITE

CORPORATION

2005 RIVERDALE AVENUE, PORT CHESTER, N. Y.

Small Shop on Job

TURNS OUT WOODWORK FOR BRICK HOUSES

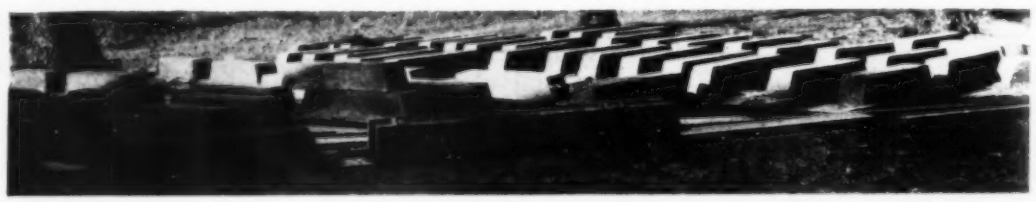
(Continued from page 67)

walls are laid up All Rolok bond, as indicated by an accompanying sketch. Some houses have exterior walls faced with hard common red clay brick; in these walls the concrete bricks are used only as stretchers to fill between headers in the interior face of the wall. Other houses have walls built exclusively of concrete brick, and these walls are given an exterior coat of Bondex cement paint.

Cellar — Partial excavation under each house provides a basement with a floor area of about 330 sq.ft. and a clear height under the floor joists of at least 7½ ft. The basement floor is 3-in. plain monolithic concrete.

Heat for the house is supplied by a gas-fired gravity hot-air system with ducts to each room. The living room has a wood-burning brick fireplace.

KITCHEN FAN designed by L. NEAL SMITH, builder (holding two parts of unit), has mercury switch which automatically turns fan on when hand chain pulls vent open. Fan installation requires no framing; cylindrical housing is set in brick wall and plastered.



CONCRETE LINTELS to be placed above window and door openings are cast in wooden forms with sloped end pieces which can be adjusted to produce lintels of different lengths.

FLOOR GIRDER bridging basement span has steel web bolted between 2x10-in. timbers.

STEEL CASEMENT WINDOWS anchored by timber braces are built into exterior walls of concrete brick. Solid masonry jambs are laid up on both sides as indicated by accompanying sketch.

PROPER LOCATION OF THE MAIN SHEAVE WILL GIVE LONGER ROPE LIFE

The fleet angle, that is, the angle formed by lines drawn from the main sheave to both right and left rims of the hoisting drum should never be more than 3 degrees. If there is a greater angle needless side wear of the rope always occurs. This is true of both grooved and smooth drums. The condition when found may be corrected by increasing the distance between the main sheave and the drum. Diagrams, showing the proper location of the main sheave, will gladly be sent to you upon request.

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Finish the job quicker and save money with electricity.

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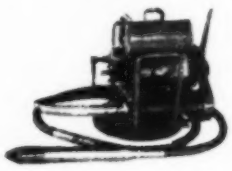

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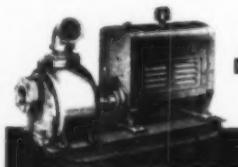

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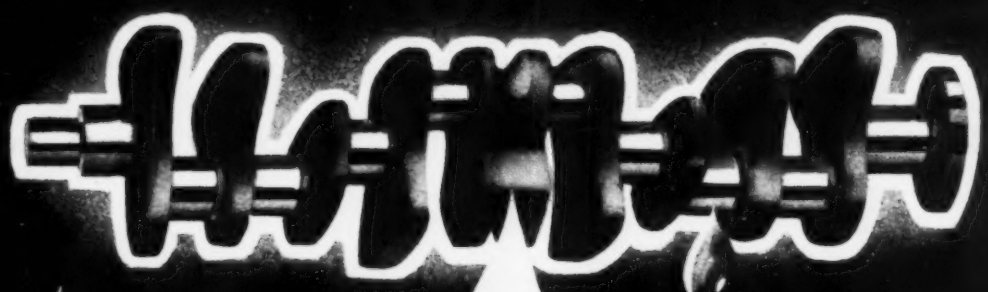

Then Lubricate WIRE ROPE!

(IT HAS A THOUSAND "BEARINGS" PER FOOT)

A wire rope is a machine and should be so treated. Every component wire bears upon its adjacent wires and in operation they slide and rub against each other. Just as the crank-shaft bearings in your automobile need lubrication, so do these multiple bearing pressures in wire rope.

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